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ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXVIII. No. 3312

MAY 16, 1941

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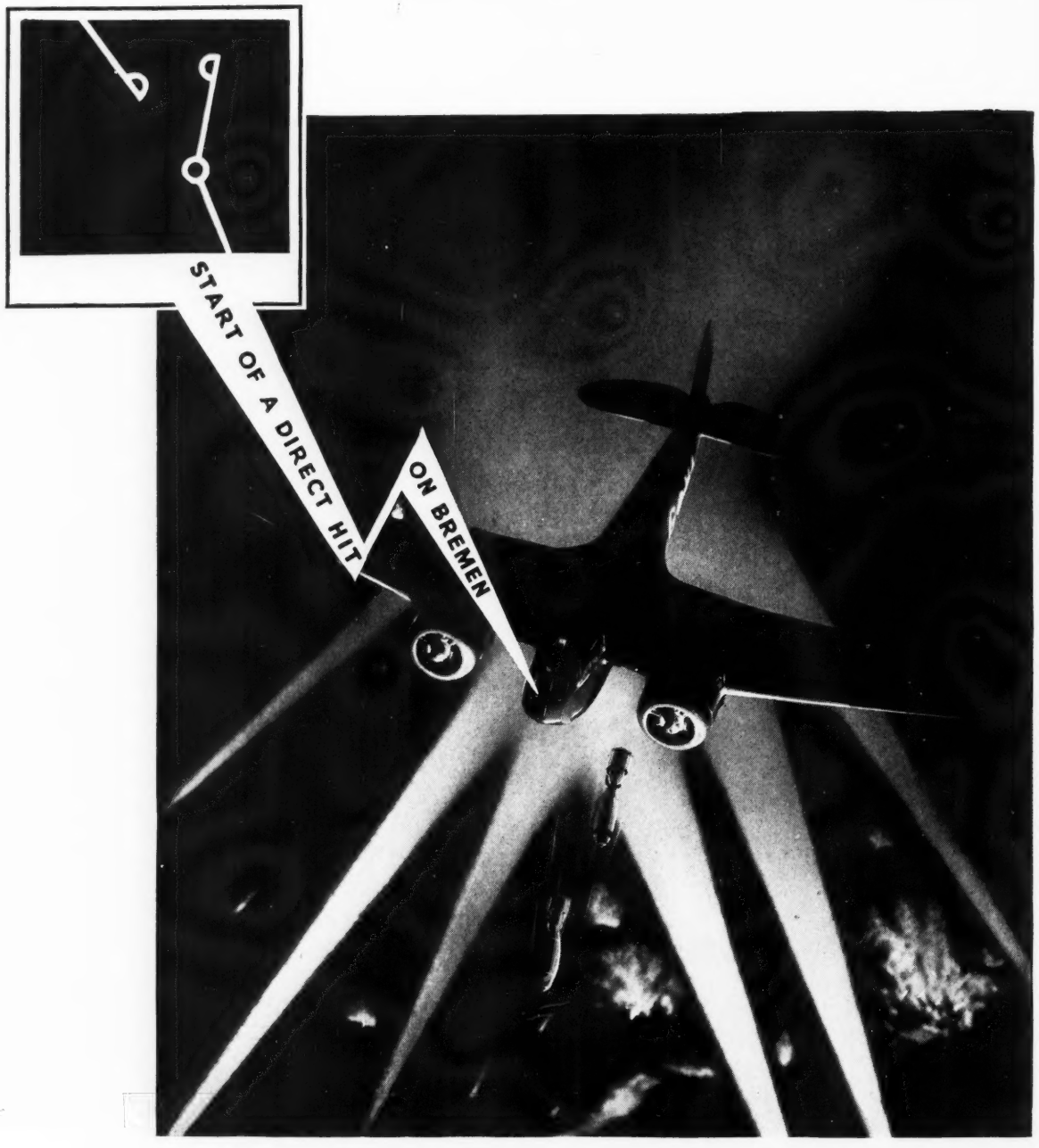

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THE ELECTRICAL REVIEW

Volume CXXVIII — No. 3312

Friday, May 16, 1941

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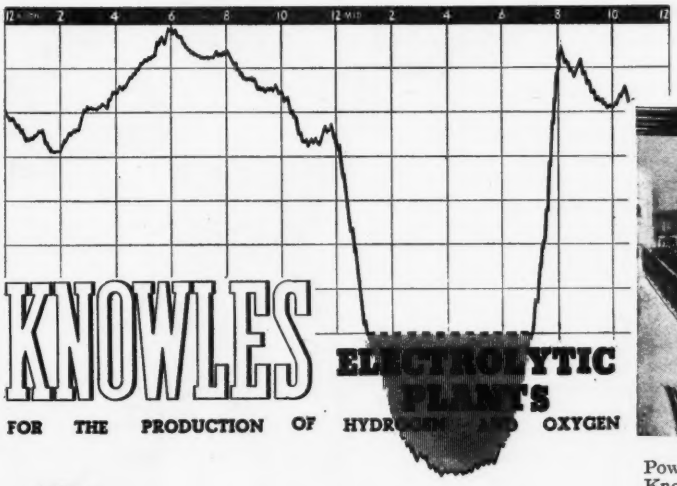

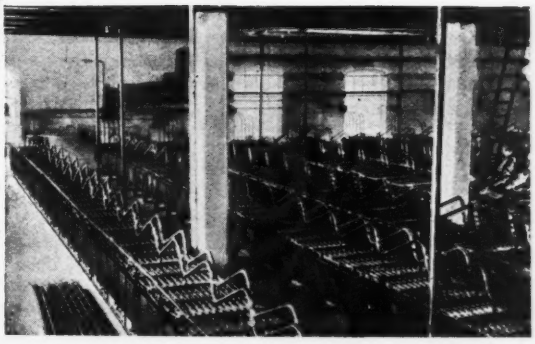

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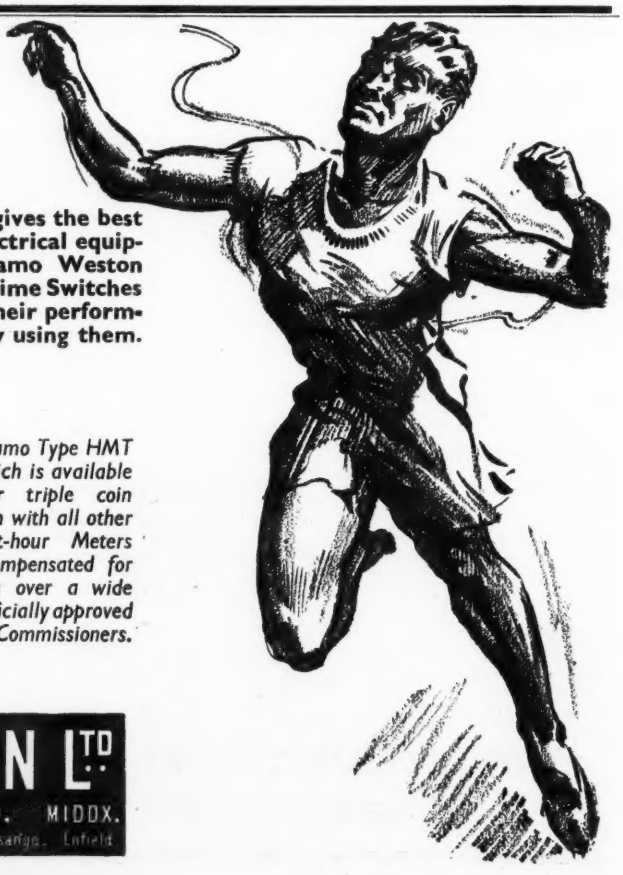

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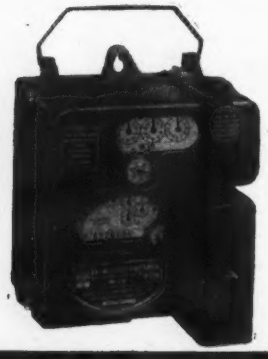

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THE
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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVIII. No. 3312 MAY 16, 1941 Price SIXPENCE

Motor Control-gear Production

A Plea for the Acceptance of "Makers' Standard"

THAT section of the electrical industry which is devoted to the manufacture of motor-control apparatus is not so much in the public eye as many others, but it is nevertheless as vital a link as any in the chain of industrial production. For months past the demand for motor starters of all descriptions has been such as to tax the resources of the makers to the utmost.

Designers of control equipment, whether of the manually-operated or the automatic type, who know workshop conditions are able to claim a substantial share of the credit for the way in which industrial processes have been speeded up, especially with regard to machine-tool operation. In spite of the heavy duties imposed by long hours of working in the hands of those whose skill has only recently been acquired, control gear produced by experienced manufacturers has shown remarkable reliability. Maintenance costs we have found to be low and consequently, of even greater moment, valuable machines have not had to be laid off due to defective components. Manufacturers of the gear know well enough the value of a policy of rigid standardisation in enabling a large output to be obtained in relation to their resources, but the nature of their business is such that they cannot easily standardise their products to such a high degree as some other industries.

Users Can Assist in Production

Certain types of starter (*e.g.*, those covered by B.S.S. No. 587) are, of course, thoroughly standardised and mass produced, but there are other forms of gear such as multi-motor automatic panels for machine-tool control which are necessarily "specials," though even these often consist mainly of an arrangement of standard components. It is obviously of the first importance that as high a degree of standardisation as possible shall be effected if the manufacturing capabilities of the control-gear industry are to be used to the best advantage. By accepting "makers' standard" and also by avoiding over-complication as far as ever possible, those concerned with the purchase of control equipment can do more than they probably realise to help the manufacturers in their efforts to increase production.

A considerable number of makers in Great Britain have been in business for many years and have thus been able to gain great experience in the application of their products to an exceedingly wide variety of tasks. If told at the outset of the duty which a starter is to perform and, if unusual, the conditions under which it has to operate, they can be relied upon to provide a standard equipment which will do all that is required of it, without the purchaser giving himself the trouble of trying to influence the design by specifying particular features, any or all of which may represent a radical deviation from the makers' standard and therefore be prejudicial to production. Due weight should be given to the fact that control-gear manufacture involves a high degree of specialised knowledge.

Control gear as supplied is doubtless sometimes not beyond criticism, but our experience is that the makers welcome constructive suggestions based on actual experience. Distinction must, however, be made between such criticism based on experience of a particular starter under particular conditions, and attempts to refer such criticism to other types and other conditions.

Influence of Motor Design

This brings in the point that the subject of control needs to be considered in relation to the development of the motor itself. A few years ago the great asset of the electric motor, its versatility, was regarded from apparently conflicting points of view. There was, on the one hand, the wide adaptability of the standard machine and, on the other, the ease with which design could be modified to render it more suitable for particular applications. Time has shown that the two aspects are complementary rather than opposed. There are excellent ranges of "off-the-shelf" motors and equally good motors in other ranges, each of which is designed to serve a broad class of work. This has led to the idea of classification by industry.

The question then becomes one of how far the motor should be standardised (in the sense of making it a general-purpose machine) to achieve maximum versatility and how far the control gear should be standardised, having the same end in view. It seems logical to require a maximum standardisation of the motor, leaving the control-gear maker all the latitude necessary to allow the motor the widest possible field of application, *i.e.*, control gear should increase the versatility of the motor.

It may be assumed that the manufacturers of motor control gear wish to play their part in the war in the

most effective way by producing the maximum amount of apparatus in the shortest time, at the cheapest cost, and with the utmost economy in labour and material. They should be given their chance to do so by the acceptance of their standard equipment to the greatest possible extent.

The I.E.E. Annual Meeting

SOME of the local centres of the Institution of Electrical Engineers have managed to maintain their activities in the provinces, but there have not been any ordinary meetings for the presentation and discussion of papers at the London headquarters during the 1940-41 session, now drawing to a close. The contacts and intercourse which these gatherings ordinarily make possible have been sadly missed, so that it was to be expected that the meeting on Thursday of last week would be well supported. It was preceded by the Council luncheon graced by the presence of many distinguished guests, and ended with the annual general meeting, the sixty-ninth. A considerable attraction was the Kelvin Lecture, the thirty-second, delivered by Dr. S. Chapman, who is professor of mathematics at the Imperial College of Science and Technology. He chose to speak of the "Electrical Works of Helios," explaining how the sun has been kept so hot for so long and how emanations therefrom, corpuscular as well as radiant, affect the three ionospheric layers with which radio-communication engineers are so deeply concerned.

Soldier and Engineer

DESPITE the importance rightly attributed to engineering in modern warfare, few of its practitioners have achieved eminence in both fields, as has Lieut.-General A. G. L. McNaughton, the recipient of the Sir John Kennedy Medal for his contributions to engineering science. Known to all as the Commander of the Canadian Forces in Great Britain, General McNaughton (whose membership of the Institution of Electrical Engineers dates back to 1912) evidently sets greater permanent store by his work as President of the National Research Council of Canada. He only put matters in the right perspective when he expressed the hope that it would not take long to finish off his more urgent job in Europe so that he might return to his high-voltage investigations in Canada.

Soldering

A DIFFICULTY hitherto found in soldering electro-tinned parts appears to have been got over as a result of experiments carried out by the Tin Research Institute. These have shown that in present practice the tendency is for the coating of tin to be applied too thinly and consequently to be converted by diffusion into an alloy which is not easily wetted by molten solder. With a greater depth of coating, it is found that parts can be easily soldered, using resin as a flux. This should be helpful in jointing connections of such relatively delicate things as instruments and electrical components, as often the copper or brass cannot be effectively soldered without a corrosive flux, and this is not always easy to remove afterwards.

Surge Phenomena

THE next best thing to knowing a subject is to be able to find readily any information available about it. With increasing specialisation it becomes difficult to keep account of what has already been done even in one's own field of operations, and still more so the developments in kindred work. The effort of the Electrical Research Association to secure a fuller utilisation of the fruits of research is most commendable in this connection, especially in regard to summaries of earlier investigations. A good example of this is the proposal to issue in book form the results of investigations into surge phenomena during the past seven years which have been financed largely by the Central Electricity Board. The publication will be welcomed by transmission engineers and will also provide the datum line for any future research on the subject.

Responsibility for Rationing

FROM the earliest stages of the matter we have not been satisfied that the Mines Department was the proper authority to handle the rationing of electricity, if and when that ever became necessary. Consequently we are not sorry to learn from a statement in the *I.M.E.A. Journal* that the Department recently intimated that in future it would not have the responsibility for the rationing of gas and electricity. We have been unable to discover who will have that responsibility but it is reasonable to assume that the Electricity Commissioners, or the Department to which they are eventually attached, will look after electricity, although we hope that it will not become necessary to add this to their other burdens. Gas rationing would seem to be the concern of the Board of Trade at present.

Portable Tools

As valuable aids to production in industry, portable electric tools are coming more and more into their own and in existing conditions they are having an excellent opportunity of proving their merits. It is all the more necessary, therefore, that the flexible cables connecting them should be frequently inspected and carefully maintained. Figures given in "Electrical Accidents" (the Home Office publication) over a number of years show that a large proportion of the accidents that are attributed to the use of electricity in industry are due to defective flexibles. The weak spots are the points of entry into the portable apparatus and its plug connector, but the strain can be effectively and easily relieved by means of properly designed reinforcing rubber sleeves and cable grips, which also, by preventing frequent severe bendings at one point, add to the life of the cable.

Unfair Criticism

REFUSING a request from Corporation housing estate tenants who now cook by electricity or gas to have their kitchen ranges replaced by open fires, the Chelmsford Town Council has told them that kitchen ranges are more dependable in wartime when gas or electricity might be cut off. In the light of experience so far is this not rather unfair on electricity at any rate? There have inevitably been failures of supply, but almost without exception these have been of very short duration and quickly rectified. The maintenance of the supply has in fact been one of the outstanding features of the war on the "Home" front. Can the same be said for coal supplies? There can be few households which have not experienced inconvenience in this direction.

Open Secrets

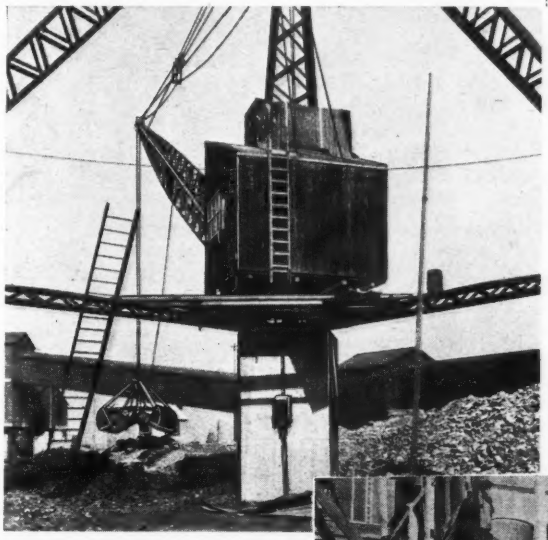
IN our last issue we had something to say about the reticence of electricity supply authorities since the publication of annual reports and accounts was banned, pointing out that much of the matter withheld was of no possible use to the enemy. Now we desire to make another complaint regarding secrecy carried to absurd lengths. It appears to be the custom nowadays to label all sorts of communications "Private and Confidential." While this is frequently justifiable, more often than not the subject matter is certainly not to be so described and is in fact "public property," or else it has been given such a wide circulation that any attempt to "keep it dark" is hopeless. But we think the limit is reached when a communication marked "Private and Confidential" goes on to say that "any prominence which you can kindly give in your editorial columns to this matter will be greatly appreciated."

A Tarmacadam Works

Electrical Methods of Sizing, Preparing and Coating Stone

IN addition to the electrical industrial heating and power applications to the processes involved in the production of tarmacadam as we recently saw them at the Barking works of Crow, Catchpole & Co., Ltd., the story we have to tell also relates to an interesting scheme of electrical interlocking designed to prevent the banking up of materials on a sequence process line. The significance of this scheme of interlocking rests largely on the fact that practically every component of the production plant which is operated essentially on the continuous-flow and sequence principle is individually driven.

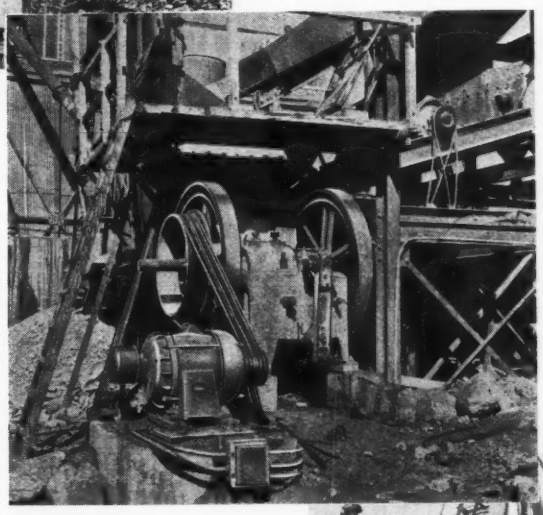
In this installation electric drive is again employed to ensure a continuous and controlled flow of material. Electric heating is also used for tar boiling

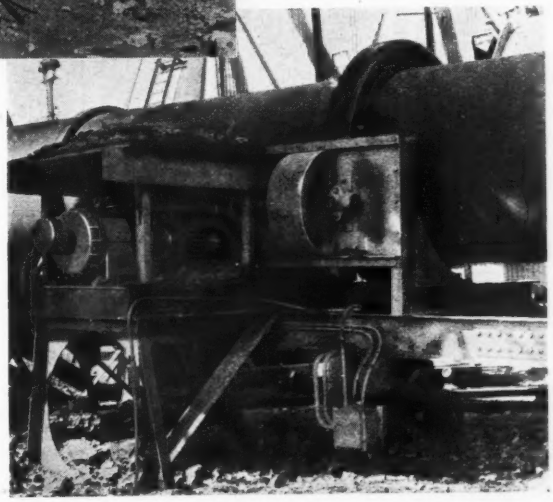


This converted Scotch derrick crane delivers raw stone from the dump

The works raw materials are broken blast furnace slag and tar, both of which are delivered to the site by road vehicles. The slag is grabbed from the delivery dump by a 7-ton Butters Scotch derrick-type crane equipped with a 70-HP motor for lifting and a 12½-HP motor for both slewing and luffing. This crane, which has a jib 80 ft. long, is the subject of a past conversion scheme from two-phase 200 V to three-phase 400 V. The stone is delivered from the crane grab into a hopper at the top of a square girder structure about 30 ft. high, and from the bottom of the hopper it is passed by a mechanical feeder to the chute serving a stone crusher at ground level.

The jaw crusher reduces the stone from sizes up to about 12 in. to sizes about 3 in. It is driven by a 30-HP motor with multiple V-belt transmission, with a speed reduction ratio of about 3 to 1 on the jaw shaft of the crusher. From the bottom of the crusher the reduced stone is fed to a bucket elevator which delivers the material to a chute feeding a rotary dryer. The elevator is driven by a 3-HP motor mounted near the top of the elevator girder structure, and it drives first through a countershaft arranged to give a reduction ratio of about 3 to 1 and then by a belt to a pinion gear shaft and finally to the sprocket wheel of the elevator.





Above : A jaw crusher which reduces the slag to about 3 in. size. Right : The rotary dryer prepares the stone for the application of tar

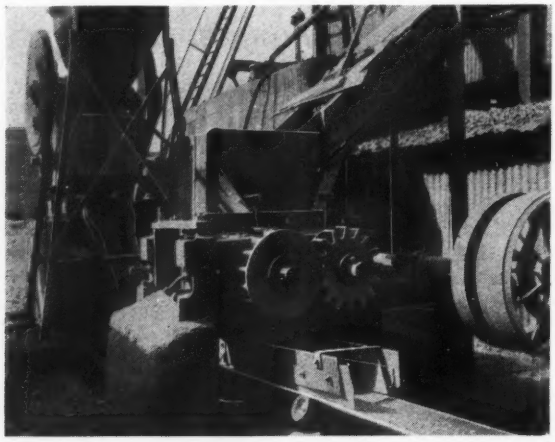
The rotary dryer prepares the stone for the later reception of the tar. It has a drum 40 ft. long and 5 ft. in diameter which, slightly inclined from the horizontal, revolves on rollers at two points. It is driven by a 20-HP motor which, running at 1,000 RPM, first transmits through a reducing gear from which a right-angle transmission is taken to a pinion wheel which engages with gearing round the periphery of the drum.

During its travel from end to end inside the dryer, the stone is continually raised and dropped by lifting plates on the inside of the drum, while hot air is continuously blown through the drum in the opposite direction. An " open inlet " fan for this purpose is situated with a coke stove at the lower end of the dryer, and it passes the air across the top of the fire, thus drawing the hot gases with it. This Sturtevant fan is directly coupled to a 12-HP 2,880-RPM motor.

From the dryer the stone is fed on to a belt conveyor V-belt driven by a 5-HP motor with a 3 to 1 reduction, and this belt delivers its charge to the main plant elevator, which is also of the bucket type and has a lift of about 80 ft. to the elevated screening plant. A 12-HP motor serving the main elevator transmits by way of a countershaft in a manner similar to that of the other bucket elevator, except that the two transmissions are by long flat belts.

From the top of the elevator the stone falls into a screen which is belt-driven by a 12-HP motor mounted on a landing about 20 ft. below. Transmission is first by belts to primary and secondary countershafts on the second of which is a pinion which drives a spur wheel attached to the screen cylinder which revolves at about 12-RPM. The screen is about 40 ft. long, inclined slightly

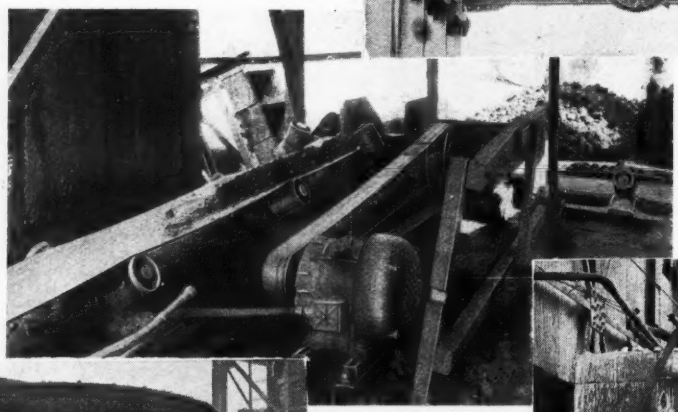
from the horizontal, and it grades the stone into the following sizes: dust and ¼, ⅜, ⅝, ¾, 1½ and 2¼ in. Rejects from the screen are passed out to a granulator driven by a 10-HP

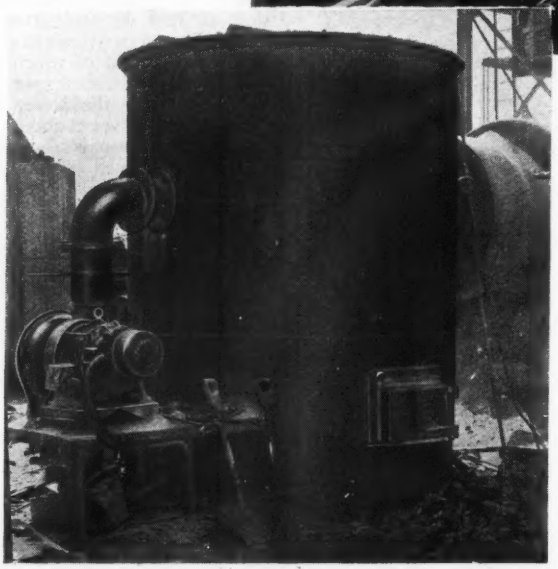


The granulator and crushing rolls serve a common belt feeding the main elevator

motor with multiple V-belt transmission on to the jaw shaft.

This granulator is, in effect, a finer jaw crusher which further reduces the stone to 1½ in. and delivers the reduced material to a belt conveyor which serves the main elevator already described. The conveyor has a 5-HP motor drive. There are also a set of crushing rolls which are fed with stone from a point mid-way along the screen, so as to deal with a surplus of, say, 1½ in. stone, if such surplus is dictated by the market conditions. These rolls are driven by a



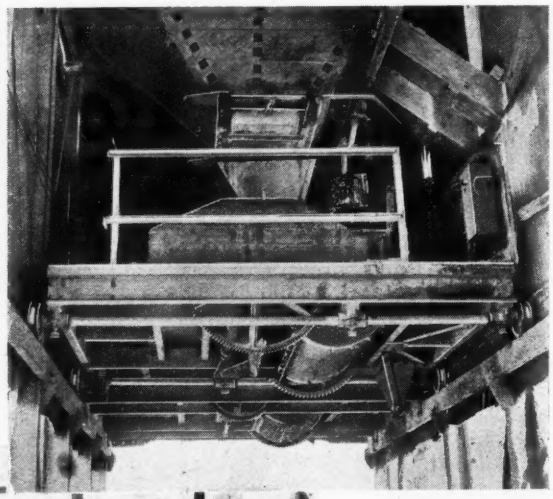


Motor-driven fan for passing air over a coke fire into the dryer

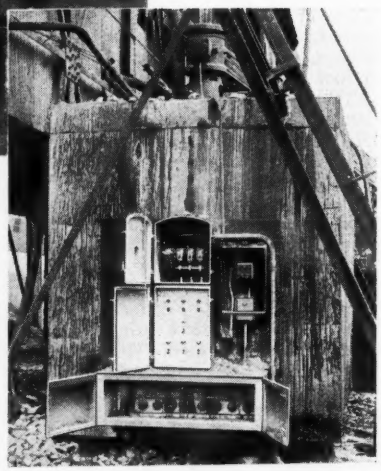
10-HP motor that is provided with a long belt transmission to a countershaft upon which is a pinion drive on to the first rollers.

The rolls are mounted over, and feed on to, the belt conveyor which delivers the material from the granulator to the main elevator.

From hoppers under the rotary screen the stone is fed into either of two tarring mixers. One of these is stationary under one hopper, while the other is a travelling unit which can be fed from either of two other hoppers. The travelling mixer, which has a span of about a dozen feet, runs on two rails, one on either side of the girder structure of the screening



Above: The travelling mixing plant runs on rails about 20 ft. from ground level. Below: From the 3,000-gallon tar boiler the tar is kept continuously in circulation



Above: The main elevator is served by normally disposed belts from the dryer to the granulator

plant, about 15 ft. from ground level. It is self-contained with its travelling and mixing motors. The travelling motor is of 3-HP and transmits through two sets of pinion gears. It is controlled by an E.A.C. drum-type starter.

By means of lever-operated doors under the hopper and a spray connection to a tar pipe-line just over the mixing tank, both the stone and tar are fed into the tank in which they are mixed together for thoroughly coating the stone by means of several paddle arms projecting from a central horizontal shaft. This is driven by a 25-HP motor which has two large pinion-gear reductions, one direct from the motor shaft to a countershaft at one side of the tank, and one direct on to the mixer arm shaft at the other side of the tank. This motor is controlled similarly to the travelling motor and both the travelling and mixing motors are slip-ring machines. The driving arrangements on the stationary mixing plant are similar to those on the travelling

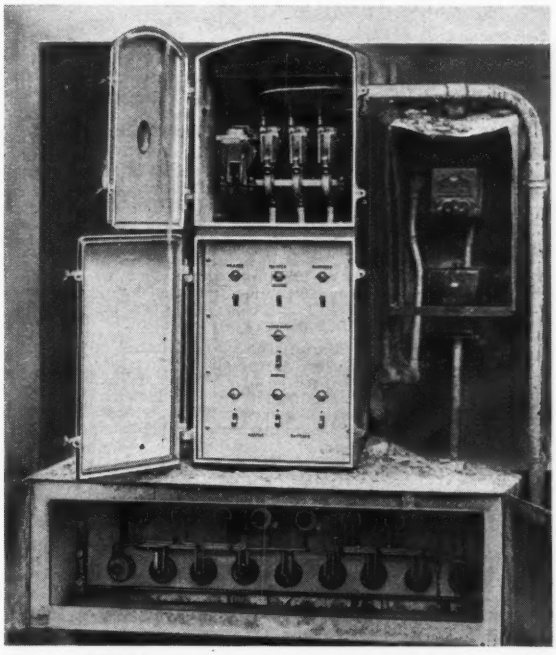
equipment, except, of course, there is no travelling drive.

The hot tar is delivered to the mixing plant directly from an electrically heated Clarmac tar boiler at ground level. To appreciate fully the function of this boiler it should be realised that there is a set of optimum conditions for coating a given stone with a certain binding material to obtain the desired results, and these conditions depend upon the accurate control of temperature of the binding material—in this case tar. This accurate temperature control requirement is, in itself, ample justification for adopting the electrical method of heating, but there are other reasons too, such as simplicity of boiler plant and economy.

The boiler is of rectangular section and is heat insulated with six inches of glass wool between the boiler and a brick surround. It has a capacity of 3,000 gallons and its total loading of 45 kW is designed to enable the full contents of the boiler to be raised to the mixing temperature during non-working hours. Once that temperature has been attained it is necessary only to replace the heat losses which are only about 2 or 3 kWh per hour.

For a greater part of the operating time, then, the full loading is not required, and to this end the five 9-kW immersion heater groups situated in the lower part of the tank can be switched off individually, leaving any required number on automatic control. Two thermostats are adjustable to give any desired temperatures from 125 to 325 deg. F. At any setting point between these limits the temperature of the tar can be maintained within plus and minus 5 deg. F. Through a temperature-operated relay the thermostats control contactors which actually govern the immersion heaters.

Because of its constituents of different densities it is undesirable in the interests of consistency to allow the heated tar to flow by gravity from the boiler. A ring-main tar-circulating system is therefore employed. This embraces a vertical motor-operated pump in the top of the boiler and a pipe line running immediately over the tanks of the mixing plants and back to the boiler. Whether or not tar is actually being taken from the pipe line the motor is running continuously during working hours, so that the tar constituents are kept mixed, and the fluid has a constant consistency. There is a second and similar boiler at the works.



The five 9-kW immersion heater groups can be individually hand switched so that any loading may be left on automatic control

In order to provide the necessary interlocking for so many individual drives in an essentially continuous-flow plant, all the motor starters are contained in a switch house in which are also situated the main oil switch, busbar chamber, and so on. The sequence of operation is such that it is necessary in the event of a breakdown of one motor to stop other motors on the plant, so that they will not build up material on the line before the point of breakdown. Further, it is at times convenient to interlock motors for short periods. The general lay-out arrangement, then, is such that any one motor on the plant can be conveniently and readily electrically interlocked with any other motor from the central control point.

Practically all the motors are of Brook production and of the totally enclosed surface fan-cooled type. The electrical visitor is made fully aware of this necessity before being on the site many minutes, for not only are the motors in the open, but they are subjected to very fumy atmospheres from the plant in question and surrounding industry.

Our thanks are due to Crow, Catchpole & Co., Ltd., for permission to visit the works and to Mr. W. E. Witchell, works superintendent, Mr. J. Bishop, local manager, and Mr. H. F. K. Dearlove of Fyfe, Wilson & Co., Ltd., the electrical contractors responsible for the installation and maintenance of the electrical equipment, for their assistance in the preparation of this article.

American Luxury Trains

Electrical Drive and Services

MASS Transportation reports that the Chicago North Shore & Milwaukee Railroad (North Shore Line) has introduced luxurious all-electric trains known as "Electroliners." These are air-conditioned throughout, with electrically-operated devices for cooling and de-humidifying the air in summer and heating it in winter.

"Electroliners" are four-unit articulated trains 155 ft. 4 in. long, built by the St. Louis Car Co. The four units are mounted on five trucks, each unit being articulated, increasing riding comfort and reducing the weight of the trains. The two end-units are divided into two compartments by passage-ways which provide entrance and exit to the trains. These end-units seat thirty passengers in each of the coach sections and ten passengers in the smoking compartments. A modern rest room is located in each of the smaller compartments. One of the centre-units in each train is an all-coach compartment seating forty passengers. The remaining centre-unit is a "tavern-lounge" seating twenty-six passengers.

Each "Electroliner" is equipped with eight Westinghouse motors of 125 HP each, two motors being mounted in each of the first two trucks at each end of the train. Drive between motors and axles is a departure from previous practice, in that the motor is rigidly attached to the truck frame and drives the axle through a flexible connection and a W-N gear unit. These gear units are oil tight. Smaller gears are mounted in roller bearings and the complete housings are carried on roller bearings at the axle ends. This construction together with the roller and ball bearings used on the motor armature shaft produces an extremely quiet drive.

Gears in the W-N drive have a ratio of 72 to 27 or approximately 2.66 to 1. With this gear ratio and with the full strength of fields on the motors, trains have a free running speed of 85 MPH. Train operation was started using full strength of the motor fields, but provision has been made to shunt part of the field strength if desired so that a speed of over 100 miles per hour can be attained.

The eight motors in each train are controlled by two separate four-motor control units connected so that all eight motors may be controlled from either end of the train. The Westinghouse control equipment, consisting of line switches, groups of motor and resistor switches, reversers and the master controllers, operate on 32-V circuits. The 32-V power is furnished by two Westinghouse motor generator sets and an Exide storage battery. Brake equipment consists of a Westinghouse HSC pneumatically-operated air braking system upon which is superimposed electrical operation.

The heating and air conditioning functions are combined in a unified system under control of a number of thermostats making it possible to maintain automatically three different ranges of temperature in the trains, either during cooling or heating, depending upon the time of the year and the desires of passengers. The heating comes from two sources. Floor heating is supplied by "Chromalox" strip heaters in ducts along each side of the train below the seats. Additional heating is produced by banks of fin-strip electric heaters situated in the ventilating ducts adjacent to the fans. Two General Electric ventilating fans driven by one motor discharge 1,100 cu. ft. of air per minute into the ventilating ducts, above the centre of the ceiling, extending the entire length of each car. Lighting fittings over each seat provide approximately 25 foot-candles on the reading plane.

PERSONAL and SOCIAL

News of Men and Women of the Industry

PART of the proceedings at the Institution of Electrical Engineers last Thursday was a medal-presentation ceremony. **Mr. J. S. Forrest** received the Coopers Hill War Memorial Prize for his paper on the characteristics and performance in service of high-voltage porcelain insulators. The award of the nineteenth Faraday Medal afforded an opportunity of publicly acknowledging **Dr. A. P. M. Fleming's** contributions to research and the education and training of electrical engineers.

Particularly noteworthy was the presentation of the Sir John Kennedy Medal, at the request of the Engineering Institute of Canada, to **Lieut.-General A. G. L. McNaughton,** A.M.I.E.E., Commander of the Canadian Forces in Great Britain, whose active prosecution of high-voltage research in Canada has now for the second time been interrupted by military duties in Europe.

In presenting the medal, the President (Mr. J. R. Beard) said that in common with the Institutions of Civil and Mechanical Engineers, the I.E.E. had wished to foster closer collaboration with the representative engineering institutions in the Dominions; this work had been actively in hand when war broke out, but it was intended to take it up again after the war. The presentation of this medal, however, helped to keep the spirit of co-operation alive. It was awarded in recognition of outstanding merit in the profession or of noteworthy contributions to science and engineering. Lieut.-General McNaughton was President of the Canadian National Research Council and had done a great deal to promote the constructive application of science to industry. Moreover, he had repeatedly stressed the importance of the engineer in modern warfare. The Institution was presenting to the Canadian Institute an address stating the circumstances of this presentation, and a copy of that address was also being handed to Lieut.-General McNaughton with the medal.

Lieut.-General McNaughton, expressing his appreciation of the honour conferred upon him said that he felt it was also a recognition of the National Research Council. He said it seemed that as soon as he started on a project or an investigation or research, something else happened in the world. However, the work was being continued under the Research Council and as soon as the situation in Europe was cleared up, which he trusted would not be long, he hoped to be able to get back to these problems. There was some beautiful apparatus available capable of measuring millions of volts and he hoped some day to have the privilege of presenting a paper to the Institution on this work.

Mr. G. W. Thorn, who has been acting cashier of W. T. Henley's Telegraph Works Co., Ltd., during the long illness of Mr. A. H. Foster, who, we are glad to learn, is making progress, has now been appointed cashier of the company. Mr. Thorn has been in the service of the company for twenty-seven years.

Mr. W. Phillips, of Elliott Brothers (London), Ltd., has been nominated for the chairmanship of the Meter and Instrument Section of the Institution of Electrical Engineers for the session 1941-42.

Mr. S. W. Melsom, of the Cable Makers' Association, has been nominated by the Committee of the Transmission Section of the I.E.E., for the chairmanship during the 1941-42 session.

Mr. C. O. Milton, chief electrical engineer at Maidenhead has tendered his resignation to the Corporation. He has been with the electricity undertaking since it was inaugurated in 1902.

Lord Eustace Percy has been elected president of the Royal Institution. Among other appointments are the following :—Managers: Viscount Falmouth, Mr. J. S. Highfield, Dr. Mervyn O'Gorman and Lt.-Col. W. A. Vignoles. Visitors: Miss Caroline Haslett, Professor J. T. MacGregor Morris and Mr. Howard Marryat.

Croydon Corporation Electricity Committee has appointed **Miss M. Blow** as senior demonstrator in succession to **Miss L. M. Baggs,** who has resigned. Miss Blow has been acting senior demonstrator.

Mr. B. W. Rowlinson, representative in the North-East for Walsall Conduits, Ltd., was married recently at St. Aidan's Church, South Shields, to Miss Florence Royle.

Mr. Allen West, chairman of the committee of the Sussex Provident Scheme, announced at a meeting at Brighton recently that the amount distributed among hospitals during 1940 (£35,970) was the largest since the inception of the scheme twenty years ago.

Mr. J. C. Harratt, meter superintendent with the Rugby Corporation Electricity Department, has retired after 24 years' service. At a recent gathering Mr. H. G. Middleton, borough electrical engineer, presented Mr. Harratt with a barometer and umbrella on behalf of the staff.

Mr. E. W. Golding, M.Sc.Tech., has been elected president of the Midland Branch of the Association of Mining Electrical Engineers for the ensuing year.

Obituary

Pilot Officer H. H. Hirst.—It is with regret that we learn that Pilot Officer Harold Hugh Hirst, R.A.F. (V.R.), the only son of Mrs. Carol Dreyfus and the late Lieut. Harold Hirst and grandson and heir of Lord Hirst of Witton, has been killed in action. Mr. Hirst, who was twenty-one years of age, was at Magdalene College, Cambridge, before the war and was a member of the Cambridge University Squadron R.A.F. (V.R.). Upon the outbreak of war he joined the R.A.F.

Pilot Officer G. G. Sharp.—The death is announced through enemy action of Pilot Officer G. G. Sharp, R.A.F. (V.R.), who was trained at the Metropolitan-Vickers Electrical Co.'s works at Trafford Park, and on the completion of his course went into the Mining Department. He was sent out to Johannesburg office in 1937 and returned to the Mining Department in 1939.

Mr. T. O. Callender.—We learn with great regret of the death, on May 10th, of Mr. Thomas Ormiston Callender, the only son of the late Sir Thomas Octavius Callender, at the early age of forty-five. Mr. Callender was educated at St. John's College, Cambridge, and served an apprenticeship with Callender's Cable & Construction Co., Ltd., later being engaged on the company's contracts at home and abroad. He served in the Royal Marines during the last war. In 1928 he was appointed manager of the Marine Department of Callender's and he was a director of the company and a number of associated concerns. Mr. Callender was a member of the Kent County Council and an A.M.I.E.E.

Mr. L. Smith.—We regret to learn of the recent death of Mr. Lewis Smith, managing director of Smith Meters, Ltd. Following the death of Mr. Ernest Smith in August, 1938, Mr. Lewis Smith took charge of the affairs of the company. The funeral took place on April 28th at Christ Church, Sutton. In addition to family mourners, members of the staff of Smith Meters, Ltd., attended.

Dr. C. G. Lamb.—The death is reported of Mr. Charles George Lamb, M.A., Sc.D., F.C.G.I., A.M.I.E.E., Reader Emeritus in Electrical Engineering in the University of Cambridge, which occurred on May 4th in a Cambridge nursing home. Dr. Lamb studied electrical engineering at the City and Guilds College, where as a student he helped to test the first AC transformer which was brought to this country. He went to Cambridge in 1891 to assist the late Sir Alfred Ewing in his researches on the magnetic properties of iron, and in the same year he was appointed University Demonstrator in Mechanism and Applied Mechanics. He became Lecturer in Electrical Engineering in 1903 and during the last war acted as Head of the Department of Engineering. In 1921 the post of Reader in Electrical Engineering was created for him, and ceased to exist on his retirement, owing to ill-health, in 1931.

Mr. F. F. Elliott.—We regret to record the death of Mr. Frederick Forester Elliott, borough electrical engineer of Woolwich, which occurred suddenly on May 9th at Colyton, Devon. He was previously station engineer in the undertaking. He succeeded Mr. G. W. Keats as borough electrical engineer in 1931.

Mr. W. A. Ritchie.—We regret to report the death of Mr. William Andrew Ritchie, M.I.E.E., at his home at Mill Hill, N.W.7, on May 10th. Mr. Ritchie was district superintendent to the Northmet Power Co. The funeral took place at Golders Green Crematorium on Tuesday last.

Mr. A. W. Wilson.—The death is reported from Leeds, at the age of seventy-eight, of Mr. Arthur Wynne Wilson, who was at one time with the Metropolitan Electric Supply Co., Stratford Place, W.1.

Mr. Harold Edward Gosnell, whose sudden death is announced, was a well-known electrical engineer and contractor at Colchester, where he conducted businesses at Athelstan Road and Crouch Street. Prior to commencing business on his own account he was with the firm of Truslove & Co., Colchester.

Wills.—Mr. E. H. R. Trenow, chairman of the Ceara Tramway Light & Power Co., vice-chairman of the Bath Electric Tramways and Bath Tramways Motor Co., and a director of the Bristol Tramways & Carriage Co., left £33,462 (net personalty, £33,014).

Mr. H. V. James, managing director of Witton-James, Ltd., left £58,019 gross, with net personalty £48,318.

Mr. D. P. Dunne, managing director of the Chloride Electrical Storage Co., Ltd., and a director of the National Accumulator Co., left £59,832, with net personalty £52,372.

Training of Women

WITH the increasing demand for women in factories, the training school at the Trafford Park works of the Metropolitan-Vickers Electrical Co., Ltd., which was established in 1934, is proving of utmost importance. The school was first founded with the object of training girls straight from school, but the age level has had to be gradually raised as the labour supply has become shorter, and the training of older women has presented new problems. The methods adopted to overcome these difficulties are described in the current issue of the *A.E.I. News.*

The training syllabus has been modified to suit the altered conditions. The original plan of training has been speeded up and the time spent in learning to use hand tools has been reduced, and to compensate for this, group teaching has been intensified. Among the older women the use of both hands simultaneously has proved a difficulty while economy of movements was completely strange to them.

After preliminary training the women learn more specific occupations, and when they reach a reasonable standard they are transferred to the various departments. Lectures on factory life, the care of tools, and on such operations as soldering, winding, drilling and testing are given, some of them being illustrated by cinematograph films, the lectures being, of course, modified and increased to cover wartime production problems.

Departments which run night shifts have found it difficult to obtain labour, due to the fact that older women are often averse to working at night. To overcome such difficulties the training school is running a night shift, so that women begin at once on night work under carefully supervised conditions and can be encouraged over the first difficulties.

A "Fabricated" Locomotive

New Use for Old Coaches

PARTS of two old railway coaches which used to run on the "Central" line of the Underground system have been utilised by the London Passenger Transport Board for building at its Acton works a "Diesel-line" locomotive for hauling ballast and maintenance trains, or emergency use in the tubes, duties at present performed by tank-type steam locomotives.

It is arranged to collect current from the "live" 600 V track rail, or to be propelled by its self-contained Diesel generating set as circumstances may require, and it is capable of hauling a 600-ton train on the level or one of 300 tons up a 1 in 34 gradient. The length of the vehicle is 57 ft., its width 8 ft. 2 in. and height 9 ft. 5 in. ; the tare weight in running order is 62 tons 12 cwt.

Only the oil engine and generator with some switchgear had to be purchased. The passenger compartments of the two old driving cars were cut off, leaving the equipment compartments with motors and driver's cabs. A new centre portion of the body, including the "well" of the underframe that was necessitated by limitations imposed by the loading gauge of the tube tunnels, was constructed and the two bogie ends were joined to it to form the new vehicle. The roof panels, louvres and windows are removable to provide access for maintenance.

The locomotive may be controlled from either end. Its engine is of the Petter "Superscavenge" airless injection, two-stroke cycle, cold starting type. The six cylinders of 8.5 in. bore and 13 in. stroke develop 506 BHP at 675 RPM. The crankcase has been extended to accommodate the generator feet so that the whole could be arranged for a three point mounting to avoid any risk of distortion due to flexing of the underframe. The governor has two separate speed settings, 460 RPM being the idling speed of the engine ; increase to 675 RPM is effected by means of a spring-loaded, air-operated piston, the admission of air being regulated by an electro-pneumatic valve, remotely-controlled from the driver's cabs.

The scavenging air is supplied by a blower of the positive displacement type fitted with a filter and silencer and gear-driven from the engine crankshaft. Circulating water and lubricating oil are cooled in a pair of radiators, one being mounted on each side of the locomotive. Their fans draw air from louvres in the engine compartment and discharge it outward through the radiators ; they are V-belt driven from a cross shaft, this in turn being driven from an extension of the generator armature shaft. Forced feed lubrication is employed with separate chain-driven pressure and scavenging oil pumps. The engine is started by means of compressed air at 350 lb. per sq. in. and the storage receiver is charged through a reducing valve from two cylinders charged to 1,800 lb. per sq. in. Safety devices which afford protection against damage to the engine include a lubricating oil pressure switch and an overspeed cut-out.

The generator, by the Brush Electrical Engineering Co., Ltd., is a level compounded shunt machine with a continuous rating of 750 A at 450 V. The armature is carried in one self-aligning roller bearing, being supported at the opposite end by a Wellman-Bibby coupling which is designed to reduce crankshaft resonances due to torsional vibrations.

Electrical Equipment

The change over from line to generator operation is effected by a drum type switch which can be operated only when unlocked by means of the driver's reverser key, thus ensuring that no power current will be broken at the switch contacts.

The traction equipment consists of two series-parallel sets with automatic relay controlled notching, but the size of the Diesel-generator does not allow the two equipments to notch up together in parallel, so that when changing from full series into parallel one equipment drops out while the other notches up in parallel. This modified control is maintained until the leading equipment has

The London Transport Board's "Diesel-line" locomotive

reached full parallel and current demand has fallen to half the maximum permissible generator output, when a current relay operates and the second equipment is again brought in and notches up into full parallel. A circuit-breaker with both an instantaneous action and time-delay mechanism protects the Diesel set against excessive overloads. Provision is made by means of a selector switch for either equipment to notch up first in parallel, so that should one equipment become defective the remaining one can operate to the parallel position.

A large part of the traction and control equipment is that originally in use on the two "Central" line motor cars from which the locomotive was constructed, with the addition of a number of special relays, main change-over switch and a separate main circuit-breaker to protect the generator. The original resistances have been regraded to serve for the two operating voltages. The additional equipment and the modifications to the existing equipment were made by the British Thomson-Houston Co., Ltd.

Lighting Fittings Trade

E.L.F.A. Report for 1940

WARTIME conditions have resulted in the confinement of the activities of the Electric Light Fittings Association mainly to the Industrial and Commercial Section. The Association's report for the past year, however, states that the Ornamental and Decorative Section has been busy on economic problems peculiar to that branch of the trade, while the Street Lighting Section has been mainly concerned with A.R.P. matters.

The Association, on behalf of the entire fittings industry, has conducted successful negotiations with many Government Departments on the numerous wartime industrial measures introduced or supplemented during the year.

It has been the Association's consistent policy to maintain economic prices on all fittings sold and, in spite of heavily increased production costs there had been up to the end of last year increases of only 20 per cent. in the prices of ornamental, decorative and commercial fittings and 10 per cent. in the case of the industrial range. Since March, however, it had been found necessary to make further increases in the total wartime advances—to 33⅓ for ornamental, decorative and commercial fittings; to 20 per cent. for certain lines of industrial reflectors; and to 25 per cent. for watertight, bulkhead and flameproof fittings. The Association has also established agreed price schedules for certain standard lines of fittings which have gone far to remove misunderstandings and lack of co-ordination.

Close contact is maintained with kindred bodies; the report makes particular reference to the Home Office-I.E.S. Joint Committee, E.L.M.A., the Electric Discharge Lamp Auxiliaries Committee, the Glassware Manufacturers' Association, the Electrical Fair Trading Council and the Electrical Wholesalers' Federation.

Purchase Tax

In connection with the application of the Purchase Tax the Association has established, with the concurrence of the Customs and Excise authorities, a simple formula whereby the tax may be operated as a straightforward percentage of the list price instead of employing the cumbersome method of calculating the tax on the constantly varying amount of wholesale value. Expert assistance has been given to the Departments concerned in formulating the Purchase Tax schedule of chargeable and non-chargeable fittings, and numerous individual problems have been taken up with the authorities on behalf of members and non-members.

Similar close contact has been maintained with the Industrial Supplies Department of the Board of Trade in connection with the Limitation of Supplies (Miscellaneous) Order, 1940, and this has enabled the Association to issue from time to time clear and concise statements on various points.

In June last the Association initiated the setting up of the Electric Light Fittings Export Group which, although a separate entity, is affiliated to the Electrical Goods and Apparatus Export Group

Committee and to the other groups operating under that body. This ensures to all members the maximum co-ordinated assistance in such matters as the supply of raw materials for export orders.

The report makes reference to the introduction of the new Factory Lighting Regulations and to the establishment of the National Industrial Electric Lighting Service of whose Operating Committee the Association's chairman, Mr. A. E. Iliffe, is deputy chairman. The E.L.F.A. has three representatives on this Committee and is also represented by technical lighting experts on the various local committees. To ensure the employment only of the most experienced and competent lighting engineers a rota of industrial fittings manufacturers has been established for the use of the Service and the E.L.M.A. has compiled a similar rota.

To simplify tendering the E.L.F.A. industrial fittings manufacturers have by agreement established a schedule of economic prices for certain reflectors that are likely to be in regular demand for the Government schemes. With a view to assisting approved manufacturers to obtain expeditiously the steel required for reflectors under the Ministry of Supply scheme for improving "key" factory lighting, a "global" allocation of steel has been obtained under licence which is in turn distributed among the manufacturers concerned by sub-licences issued by the E.L.F.A.

The Council

Mr. A. E. Iliffe (Benjamin Electric, Ltd.) has been elected chairman of the Council and Association for the third successive year. The other members of the Council are as follows:—*Industrial and Commercial Section*—Messrs. K. Scott Adie (Rowlands Electrical Accessories), A. C. V. Bristol (Veritys), A. V. Heyes (Heyes & Co.), and W. C. Huston (B.T.H.). *Ornamental and Decorative Section*—Messrs. C. Harvey (C. Harvey & Co.), A. J. Burbidge (G.E.C.), E. Barnard (Falk, Stadelmann), and H. C. Pride (F. H. Pride, Ltd.). *Street Lighting Section*—Messrs. A. Mansell (Edison Swan), G. J. Wells (Engineering & Lighting Equipment Co.), C. R. Bicknell (Siemens Electric Lamps & Supplies), F. W. Norris (Revo) and D. H. Ogley (Wardle Engineering Co.).

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions.

Earth-fault Protection

IN Mr. T. C. Gilbert's article in your issue of May 2nd, the controversial subject of earthing *versus* insulation is brought forward. The author states that the best protection against earth faults is insulation, but the validity of this assumption depends on a number of factors. If the installation has all the mechanical protection deemed necessary in modern systems, the likelihood of earth faults is much greater than in the days of cleat wiring and wood casing or with the more recent c.t.s. system.

In my opinion, however, the last-named form of wiring, although possessing all the apparent features of the ideal system, presents a real and very definite danger in that the handyman can readily purchase his fittings and cable from multiple stores and carry out experiments in wiring and the like in the safety (?) of his own home. Immensely proud that he has wired, say, an extra point, he immediately imagines himself to be an electrician. Not knowing the intricacies of the trade as a whole, or even in part, he cannot realise how unsafe his installation actually is. Before very long he sees before him the realm of electricity as a glorious field for exploitation.

This raises the query: What is an electrician? I have had men present themselves to me for employment as electricians bringing with them the most wonderful references, but it was apparent that their qualifications in practice were even less than those demanded of electricians' mates.

If the system be protected by mechanical means, the employment of a fully trained man is an absolute necessity, as a handyman just could not carry through the work, and obviously could not compete with the fully trained craftsman, which introduces the personal element. An experienced craftsman can give true protection with a metalclad system, as he takes every precaution to ensure that the requirements as to continuity and efficient bonding are complied with. Failing the appearance of the all-insulated electric cooker, refrigerator, etc., the earthing of such apparatus is necessary and this protection must be extended to embrace the entire system.

Cranford, Middlesex. T. BENSON.

Professional Qualifications and the Services

MAY I make use of your correspondence columns to ventilate an issue that appears to be of considerable importance to engineers who have sacrificed time and effort to secure what are generally accepted as "higher" technical or professional qualifications—at least, the Ministry of Labour in preparing the Central Register seems to have accepted them as such.

In a recent War Office advertisement, appointments were offered as "Wireless Technical Instructors" in Army units, at a rate of pay of 8s. 9d. a day (plus allowances), and the rank of "Acting Sergeant Tradesman." Now, it is not very clear whether a technical instructor can legitimately be called a "tradesman." In so far as he instructs in the use of tools and equipment, he is, presumably, nothing more than a tradesman, although the term is generally understood to mean someone who applies manual and mental skill rather than imparts it to others.

It is certainly stretching the meaning a great deal to say that one who has to *impart* technical knowledge is entitled to no higher consideration than, say, a bench hand. Teaching—in whatever capacity—has always been recognised as requiring a special ability of its own, and it seems quite ridiculous to classify an instructor in a highly technical subject such as wireless as a "tradesman."

The point is important, because the War Office apparently considers that a tradesman is entitled to no higher rank than that of "Sergeant"—or "Acting Sergeant," to be precise. When it is realised, however, that an army sergeant need not necessarily be a tradesman, nor even a skilled craftsman, the general unsatisfactoriness of the position will be apparent. Moreover, the advertisement outlines a number of desirable qualifications, among which are included graduateship of the Institution of Electrical Engineers, the Higher National Certificate, or Final (Grade III) City and Guilds Certificate in Radio Communication.

Is it too much to assert that these acknowledged hall marks of a sound technical education, are being degraded to a point where they will become quite valueless? Everyone who knows that four or five years' hard work is necessary for examinations like the I.E.E. or Higher National Certificate would agree that nothing less than commissioned rank can reasonably be offered to recruits in these categories—even if not to any technical instructor.

I fully realise the futility, of course, of trying to make the official mind see reason on any question where advancement by real merit and ability is concerned. The mere fact that the rank of sergeant is offered shows that there is no distinction in the Services between those who have technical qualifications, and the thousands of N.C.O's who have not.

One would think, however, that the Council of the I.E.E. should have something to say on a matter that surely affects the interests of its graduate members—if only from the standpoint of qualifying for associate membership. Would the Council be prepared to recognise the rank of N.C.O. for this purpose? Definitely not, because an "A.M.I.E.E." holding a lower army rank would degrade the professional standing of the members as a whole. What, then, of the graduate, who is qualified (so far as *technical* requirements are concerned) for associate membership? If the Institution is going to permit the War Office to play ducks and drakes with its qualifying examinations in this way, the question of whether it is really worth while bothering about the I.E.E. or its examinations will be something for the future student of electrical engineering to think about.

The lot of the I.E.E. graduate has not been a very happy one since he was debarred from associate membership pending appointment to a sufficiently responsible position, while he usually stood little chance of such an appointment until elected an A.M.I.E.E. The illogical vicious circle is now to be maintained by debarring the graduate from higher rank in the Services, where he could probably qualify for corporate membership, and allowing him to be classified as a bench hand!

There is nothing wrong in being a bench hand of course, except that here it is bound up with the more serious question of whether a graduate of the I.E.E. is ever to be recognised as a qualified technician and be treated accordingly.

Coventry. A GRADUATE.

Fluid Cable Insulation

WHILE obliged for Mr. Ongley's remarks, I should hesitate to accept his strictures. In considering conduit size, I assume he is referring to excessive diameter, but for a firm electrical factor of safety, this by no means dwarfs the over-all diameter of the equivalent static cable.

Admittedly, ease in laying rigid conduit cannot approach that of semi-flexible cable, and it would be confined to the long straight runs usually associated with high-voltage transmission, having vertical connections. The conductors would be tensioned at straining points, and the jointer's nightmare envisaged by Mr. Ongley would be probably less of a reality than say overhead line erection under adverse weather conditions.

There is no transformer monopoly in the expression "sludging," and Mr. Ongley's references to occlusion appear to echo those emphasised in the article. The same applies to his mention of gas under pressure as a dielectric.

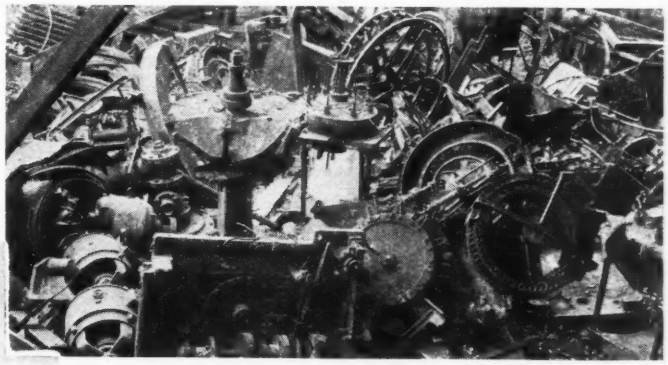
Uxbridge. R. B. FAIRTHORNE.

Salvaging Burnt Plant

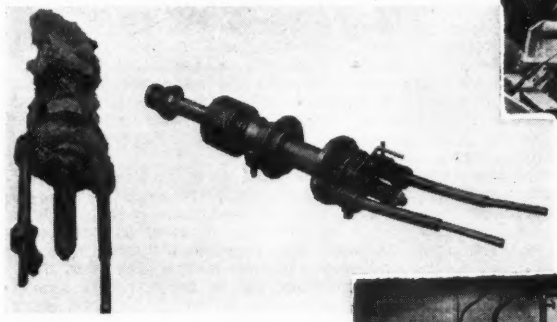
Resurrection of a Factory Destroyed by Fire

LAST September some lamp manufacturers had the misfortune to have their premises destroyed by fire. So completely was the factory gutted that all that remained were the bare brick shell and a mass of rubble and tangled metalwork originally forming the girders of the building and the machinery. Knowing the difficulties of replacing the intricate and specialised machinery required in lamp manufacture, most people surveying the ruins would have said that it was a case for notifying the local scrap metal collection service, and that the company must resign itself to being out of production until after the war.

But the managing director had other ideas. After inspecting the smoking wreckage, he instructed the female factory employees to go home and return in a week's time. The men were instructed to report next day to commence clearance of the site and salvaging. It speaks well for his confidence in handling the situation that not one of them was discharged. That his confidence was justified is shown by the fact that only nine days after the fire, production was restarted—in a small way, it is true, but nevertheless, restarted. Now, after six months, production has once more reached about two-thirds of the original, and in another three or four months' time it is hoped that the pre-fire output will be achieved.



This collection of what was apparently scrap metal will, after treatment, return to give first-class service in lamp production

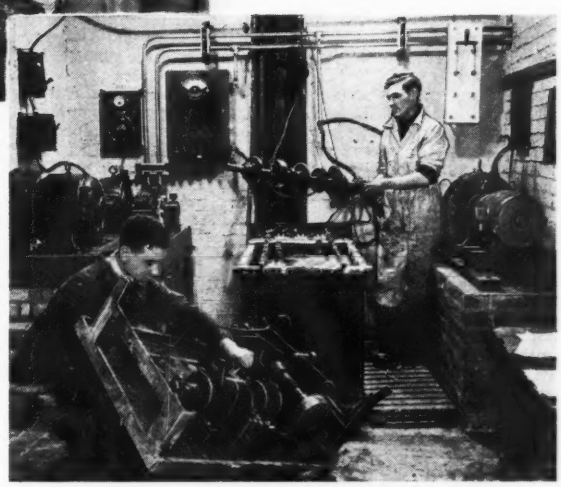


Two sealing heads which have been through the fire. The one on the left has not been treated; the other has been de-rusted but not straightened

When manufacture was recommenced, the only buildings available for work were the air raid shelters. By a fortunate coincidence it had been decided some little time previously to install a number of the spiralising machines in an air raid shelter in order to give greater security to the men who operated them at night-time, as this section of the factory had always run for twenty-four hours a day. The completion of the installation actually took place a few hours before the incident. The machines, therefore, were undamaged and available for immediate duty; but the remainder of the machinery was apparently just a mass of scrap, oxidised almost beyond recognition by the action of the fire and water.

Undaunted, however, the managing director immediately went into the question of the salvaging of the damaged plant. A start was made at once on the stripping down of what were really masses of scrap iron, and at the same time, arrangements were made for the erection of a special de-rusting plant. This plant was designed and erected by the company's own staff. The whole of the work entailed in the rebuilding of the machinery was considerably facilitated by the existence of the company's engineering department, which for some years has been producing special equipment required in the factory.

After the de-rusting treatment the components are quite bright and smooth and show no signs of pitting or physical deterioration. In many cases, however, the heat has distorted them but it is usually possible to straighten them out. Salvaging of the machinery is still continuing and we are told that with the serviceable components recovered it will be possible to replace 80 per cent. of the original plant. The opportunity was taken, however, when rebuilding the machines, to incorporate a number of improvements which in some cases have resulted in increased efficiency and output amounting to as much as 50 per cent. Features for facilitating maintenance have also been embodied. It will, therefore, be seen that there will be no lack of equipment to cope with an output equal to that before the fire.



Above: One of the manufacturing bays showing brick-built construction air-conditioning ducts and reconditioned plant in operation. Right: The de-rusting plant with, in the foreground, a damaged foot-making machine before dismantling and de-rusting

Apart from the salvaging of the machinery, all the main girders of the burnt-out factory, badly twisted by the heat, have been re-rolled and used again in the rebuilt works. The new buildings have all been constructed on the standard brick and concrete surface shelter pattern without windows. The walls are 14 in. thick with stout reinforced concrete roofs the sections of which are manufactured from steam-cured cement. All rooms have at least two and most of them three exits, which are fitted with steel doors. Steelwork is in fact used wherever possible for the factory and office furniture and practically no woodwork is employed. Excellent lighting has been installed throughout, with the new 80-W fluorescent tubes in the offices, and an elaborate air-con-

ditioning system gives twenty air changes an hour. It is thus possible for all employees to continue to work even during raids under conditions of the utmost safety.

While the factory has been in course of rebuilding, it has been necessary for night shifts to work in order to catch up with orders. This will soon become unnecessary, but to mark its appreciation of the loyalty of the night workers, presentations of gold medals, silver cigarette cases and silver medals all suitably inscribed, have been made.

As we have already mentioned, the company has not had to dispense with the services of any employee. The number of workers has, however, been reduced by the absorption of several men into the armed forces. To these the company gives varying allowances and in most cases married men have the difference between their service pay and their pre-war earnings made up. All men joining the services receive a written undertaking that they will be reinstated in their old positions after the termination of hostilities.

I.E.E. Annual Meeting

Kelvin Lecture by Dr. S. Chapman

THE annual report of the Council of the INSTITUTION OF ELECTRICAL ENGINEERS which was presented at the annual general meeting in London last week (May 8th) records a net increase in membership for the year 1940–41 of 403, raising the total to 20,275. During the last fifteen years the growth has been 7,626 compared with 6,110 during the preceding similar period, so that in thirty years the membership has been more than trebled. The corporate membership is now 10,121. The increases of 528 in 1939–40 and of 403 in 1940–41 compare with an average of 665 in the five years preceding the present war, whereas in the first three years of the last war the membership fell by 432.

The I.E.E. continues to co-operate with the Ministry of Labour and National Service in the working of the electrical section of the Central Register of National Service, but there is considerable doubt whether the fullest use is being made of the register by the authorities. To avoid a break in membership, students are allowed to remain in that class by a period equal to the length of their war service.

In co-operation with the Board of Education a scheme has been formulated for promoting vacational technical education for men in the Forces, so that they can continue their studies during their service ; 2,000 applications have been received by the War Office. Plans are also being discussed for the training of young engineers to fill vacancies in certain categories in which there is a shortage of suitable candidates.

The Institution has continued to assist the Ministry of Home Security in electrical matters, including the heating of air-raid shelters and the detection of incendiary bombs and fires. Advance planning has commenced in preparation for problems affecting electrical engineering likely to be encountered after the war, so that the Institution may be ready to provide expert advice when requested. The Post-war Planning Committee, with power to appoint sub-committees, consists of Mr. J. R. Beard (president), Mr. Johnstone Wright, Dr. A. P. M. Fleming, Mr. H. T. Young and Sir George Lee (past presidents), Col. A. S. Angwin, Dr. P. Dunsheath, Mr. V. Z. de Ferranti and Professor C. L. Fortescue (vice-presidents) and Mr. E. Leete (hon. treasurer).

Associate membership examinations were held twice in 1940 for 509 candidates at home and overseas ; 201 holders of National Certificates in electrical engineering were examined in English only and, in addition, 25 theses were submitted by candidates instead of sitting for examinations. National Certificates and Diplomas in electrical engineering awarded in 1940 numbered 1,275 in England and Wales and 48 in Scotland. Eight scholarships were awarded (two of them in abeyance) and four others were not awarded.

During the past twelve months 267 meetings were held in London and at local centres by members, the Council and various committees; papers were not read in London though some of the provincial activities were carried out. The membership of the three technical sections is Wireless 1,165, Meter and Instrument 763, and Transmission 1,660. Membership of the nine students' sections aggregates 4,267, including 2,011 graduates.

Donations and subscriptions to the benevolent fund last year amounted to £3,640. Grants were made to 83 persons, amounting to £3,952, such assistance providing for the needs of 63 dependants.

The annual general meeting was presided over by Mr. J. R. Beard, President, and was preceded by the delivery of the Kelvin Lecture and also the presentation of the Sir John Kennedy Medal of the Engineering Institute of Canada, the Faraday Medal and the Cooper's Hill Memorial Prize (see our "Personal" section, page 656).

Solar Energy and Radiation

THE Kelvin Lecture by Dr. S. Chapman, F.R.S., bore the title of "Electrical Works by Helios, or the Sun and the Ionosphere." Dr. Chapman said he proposed to discuss the production of solar energy and radiation, without which our atmosphere would have no ionised layer. He said there was also the effect of gravitation, accelerated in the form of tidal forces, more by the moon than by the sun. The same two distinct causes provided the energy that electrical engineers developed to apply in so many ways, but the sun's radiation was the chief source. Though engineering based on the direct use of the sun's heat was not yet practicable on any large scale, great use was made of past sunlight stored up in the coal measures; hydro-electric power also came from the solar radiation of our own time, which raised water from the sea to the sky, and it then descended as rain.

The lecturer drew an analogy between the coal furnace and the solar furnace and discussed solar surface phenomena. He pointed out that the location of ionised layers in the upper atmosphere was first definitely determined in 1925 by Appleton and Barnet in this country, and in America by Breit and Tuve, and also by Taylor and Hulburt.

After a discussion of the regular variations of the ionosphere, Dr. Chapman said that solar control was indicated not less clearly by the irregular changes which occurred from time to time, and among the most striking of these was radio blackout, that sometimes stopped most long-distance radio communications for a period of about an hour or less. Solar physicists had observed that such radio fade-outs usually coincided with the occurrence of eruptions of intense light at certain wave-lengths at certain disturbed points on the sun.

The most remarkable irregular changes in the ionosphere were those associated with electric storms which were altogether different from the relatively feeble changes observed during radio blackouts. These magnetic storms lasted for several hours or even days and, indeed, the earth's magnetic field remained abnormal after the storm was over, slowly tending towards normal after many days. The storm of March 20th, 1940, was in the first rank among magnetic storms, and it was unique in that it disturbed many electric power systems in the eastern United States. Never before had there been reports of interference with power transmission. McNish had reported that DC potentials of 10 V per mile were produced by the storm, causing electric surges up to 60 A, with a variation of a minute in most cases. The protective relays on some of the transformers were actuated and tripped the transformers out of action.

Distribution of Magnetic Effects

Much mystery still surrounded the mechanism of magnetic storms. In a quite moderate storm, the magnetic evidence indicated the presence of an intense current system in the ionosphere for each polar cap along and within the auroral zones. Each of these two relatively small regions covered about 5 per cent. of the earth's surface and carried a storm current system of about half a million amperes. The magnetic effects over the remaining 90 per cent. of the earth betokened a current system of about the same total intensity. It seemed not unlikely that the polar cap was the seat of a permanent system of electromotive forces due to a dynamo action by regular air movement.

In the great storm of 1940 one of the most remarkable and rapid magnetic changes occurred within one or two minutes, and only subsequently, during a period of many minutes, was it followed by notable changes in the ionosphere. According to a very imperfect but tentative theory advanced, after long consideration, by Ferraro and himself, Dr. Chapman said these changes were produced far outside the earth's atmosphere by the action of the earth's main field on the advancing stream of ionised solar gas. Some of this gas seemed to form itself, afterwards, into a great current ring round the earth, in the plane of the magnetic equator, with a radius of perhaps 10,000 miles.

In conclusion, Dr. Chapman said the impression he wished to leave was that of the great advances made during the last decade in our knowledge of the ionosphere and its relations with the sun. But, as in all branches of science where growth was active, we were only partly satisfied with the new knowledge gained, and long vistas of unexplored territory invited us onwards.

SIR GEORGE LEE, proposing a vote of thanks, said that the researches which Dr. Chapman was carrying out, together with the work of the research institutions, was having a wonderful effect on radio engineering.

DR. P. DUNSHEATH, seconding the vote, said the Kelvin Lecture was rapidly becoming one of the most important factors in raising and maintaining the intellectual level of the Institution.

COMMERCIAL and INDUSTRIAL NEWS

Proposed Mining Regulations. Rubber Control Measures.

Electricity in Mines

THE Secretary for Mines has sent a circular to mine owners and managements, owners', officials' and workmen's associations, and manufacturers of mining electrical equipment regarding the Report of the Departmental Committee which was appointed in 1939 to review the General Regulations governing the use of electricity at mines under the Coal Mines Act, 1911.

The Departmental Committee has recommended a comprehensive revision of the existing General Regulations (see ELECTRICAL REVIEW, May 2nd, p. 621) in order to bring them into harmony with modern electrical practice and to embody in them the higher standards of safety which are now attainable, and has appended to its Report a full draft of the revised regulations that it recommends for adoption.

The Secretary for Mines feels that so comprehensive a revision of the Regulations cannot be undertaken at present, but he has arranged for the Report to be published in order to give mine owners, agents, managers and electrical engineers, as well as manufacturers of mining electrical equipment, the opportunity to study it and the draft revised regulations. He hopes that they will do so, and will apply the new code gradually, as opportunity offers, by adapting existing installations and practice and by installing new plant in compliance with it. In this way both mine managements and manufacturers of electrical equipment can, by their co-operation, hasten the general adoption of the higher standards of safety and practice recommended by the Committee, and by anticipating the requirements of the revised code of regulations they will facilitate its establishment in due course and save themselves trouble and expense.

Control of Rubber

The appointment of Sir Walrond Sinclair as Rubber Controller, reported in our issue of May 2nd, has been followed by an announcement that the Controller will become the sole importer of rubber into the United Kingdom and will also make sales to dealers and manufacturers. Existing contracts with consumers and others are to be carried out but, if further purchases from abroad are necessary, the agreement of the Controller must be obtained.

The purchase of rubber and service to consumers will be made through the Rubber Trade Association and commitments with non-members of the Association must be liquidated as, or before, they become due. Exceptions to this are made in the cases of those firms on the exempted list, manufacturers and producers, but particulars of any rubber taken up must be sent to the Rubber Trade Association. It is proposed to allow dealers to carry a stock of various grades for the requirements of manufacturers.

The Board of Trade has issued a notice that the Open General Licence permitting the importation of rubber, gutta percha and balata is withdrawn from May 7th. From that date separate licences will be required, except where it is proved that goods were shipped to the United Kingdom before that date and are imported before July 7th.

A.R.P. Exhibitions

On May 5th, comprehensive exhibitions, under the auspices of the Ministry of Home Security, illustrating the various methods of protection of glass in houses, factories and shops, glass substitution and ventilation and obscuration in the blackout, were opened simultaneously at the Building Centre, 158, New Bond Street, London, W.1, the Building Centre, 425, Sauchiehall Street, Glasgow, C.2, the Manchester Municipal School of Art, Cavendish Street, All Saints, Manchester, 15, and the Museum and Art Gallery, Queen's Road, Bristol. Exhibits from more than 150 firms are being shown in London and all have been submitted to the Research and Experiments Department of the Ministry. Representatives of local authorities, surveyors, architects and the general public are invited to see samples of actual materials and equipment used to carry out the recommendations of the Ministry.

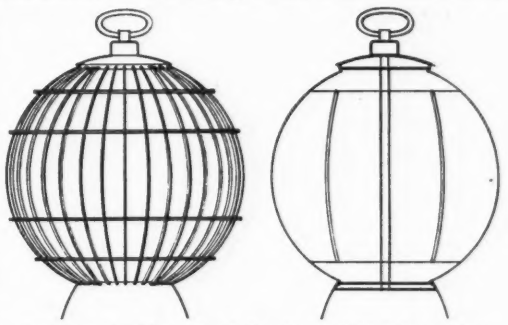
A specimen of the new Morrison table shelter is on view, as well as samples of shuttering for north lights and factory roofs.

War Transport

The Government's decision to amalgamate the Ministries of Shipping and Transport has been followed by an announcement that the new department will be known as the Ministry of War Transport. Mr. F. V. Leathers (who is being created a baron) is the Minister, Col. J. J. Llewellin and Sir Arthur Salter are appointed Joint Parliamentary Secretaries and Sir Cyril Hurcomb becomes Director-General. All the present functions of the two combined Ministries are at present to be exercised by the Ministry of War Transport.

An Aluminium Electric Fire

After the war there is likely to be a very considerable expansion in the use of aluminium and the Aluminium Union has invited a group of well-known architects and designers, including Mr. Christian Barman, Mr. Grey Wornum, Mrs. Grace Lovat Fraser and Mr. Michael Rachlis, to consider the part the metal will play in reconstruction, replanning and turning over of workshops to peacetime needs. Ways of utilising aluminium's special properties are already being devised by the Group, and Mr. Barman has submitted a design for an electric fire. In the form of a spherical basket the fire is built up from vertical and horizontal rings of anodised aluminium of contrasting colours, the vertical rings being of thicker and squarer sections. The base is of spun sheet aluminium with the bottom slightly weighted to give extra stability, though from the safety point of view this is unnecessary as there is no risk of fire even if it is knocked over on to its side. A ring-shaped handle of plastic material is provided at the top and the heating element of the rod type is fitted vertically in the centre of the basket with a polished aluminium reflector, concave in the middle and convex at the sides. The fire is about 2 ft. high and 1½ ft. in diameter and weighs only a few ounces.



Design for aluminium electric fire showing (right) the position of the element and reflectors

E.I.B.A. Luncheon

The annual luncheon of the Electrical Industries Benevolent Association will be held on June 17th, at the Connaught Rooms, and applications for tickets, which are limited in number, should be made as early as possible to the Association at Little Gaddesden House, near Berkhamsted, Herts. The luncheon will be preceded (at noon) by the annual general meeting of the Association.

War Damage Claims

The Treasury has made the War Damage (Notification and Claims) Regulations, 1941, which lay down the procedure to be followed by claimants under the War Damage Act, 1941. The Commission set up under the terms of the Act has to be notified within thirty days of the occurrence of the damage, but where notification has already been made to the Valuation Department of the Inland Revenue or other Government Department before the coming into force of the regulations this will be considered sufficient although the Commission may require further particulars to be furnished. Copies of the regulations are obtainable from the Stationery Office at 2d. each.

The War Damage (General) Regulations, 1941 (Stationery Office, 1d.) give directions as to the valuation of articles becoming available as materials from premises which have suffered war damage; stipulate the time for making "value payments"; and impose restrictions and conditions upon payments for the benefit of persons not resident in the United Kingdom.

Gas Research Board

The Gas Research Board has been registered as a company limited by guarantee without share capital, with an unlimited number of members, each of whom is liable for not more than £5 in the event of winding up. Sir David Milne-Watson, governor of the Gas Light & Coke Co., will be the first president.

Insurance of Utilities

In the House of Commons last week the Chancellor of the Exchequer was asked whether in view of the exemption of public utilities' property from compulsory war damage insurance such property should be insured voluntarily under the Business Scheme.

Sir Kingsley Wood replied that as further legislation on the matter of war damage to public utility undertakings was foreshadowed in Section 40 of the War Damage Act such undertakings should defer the insurance of their movable property for the time being. The days of grace allowed under the Business Scheme would, if necessary, be extended accordingly.

Trading with the Enemy

Amending the notice on this subject issued on April 30th, the Board of Trade and the Ministry of Economic Warfare announce that mainland Greece is to be regarded as enemy occupied territory. In addition, it is recalled that in accordance with Section 15(1) of the Trading with the Enemy Act, 1939, any other Greek territory which may at any time be in enemy occupation is for such time to be regarded as enemy territory.

Concentration of Production

It was stated by a representative of the Board of Trade last week that it was not proposed at the moment to apply the Concentration of Production Order to the electrical industry. No surprise is created by this announcement since even electrical firms affected by the Limitation of Supplies Order will no doubt by this time have had their surplus production capacity absorbed by work of national importance, either to meet Service requirements or for export.

Industry after the War

Government control of industry will have to continue for some time after the war, stated Capt. Oliver Lyttelton, President of the Board of Trade, at a luncheon last week of the National Defence Public Interest Committee. A special section had been set up by the Board of Trade to examine particularly the problems of the first two or three years after the war. For the first time in her history Great Britain would be internationally a debtor country, which meant that we should probably have to discriminate in our export trade to get the maximum advantage in foreign currencies. The demand for con-

sumer goods would be unprecedented all over the world. The shelves would be bare. After the war there would therefore be, if unchecked, an enormous boom in consumers' goods, with mushroom production springing up everywhere. That movement would have to be controlled.

Co-ordination and Concentration

Speaking at the annual meeting of the Association of British Chambers of Commerce last week, the president, Sir Ronald Matthews, expressed the opinion that complete economic co-ordination could only be attained through a "super-Minister" with powers to override the conflicting claims of the Departments to priority.

In a reference to the concentration of industry, Sir Ronald agreed that this was a necessary corollary to the limitation of supplies. But it was a painful process for the businesses concerned and they were entitled to the most definite assurances that their position would be adequately safeguarded so that they would be able to take a share in the flow of work which would follow after the war.

Power-Type Loud Speakers

A new leaflet (No. 25) has just been issued by the General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2, entitled "G.E.C. Sound Reproduction Power Speakers." Its object is to explain the latest power type loudspeaker units and exponential horns for them; as well as folded horn, cabinet and omni-diffusion type speakers. For the projection of acoustic energy over large areas out of doors there are two driving units and exponential horns which are interchangeable so that four alternatives are available. For mounting on the bumpers of motor cars, or other mobile use, there is a new folded type of horn only 8 in. deep by 10½ in. high (including mounting bracket) with a mouth diameter of 9 in., yet it provides an air column of more than 20 in. and complete with a low-impedance moving-coil driving unit it is capable of handling a maximum of 4-W input.

Another model for internal use is the "Junior Omni-Diffusion" speaker, designed for sound radiation in all directions in public rooms or factories where the noise level is reasonably low.

Supplies of this equipment are, at present, restricted to installations for which Government contract numbers and material authorisations are obtainable.

Registration of Premises

An Order made by the Board of Trade requires the owners of premises which at any time since January 1st, 1938, have been used for storage purposes and have an area of 3,000 sq. ft. or more to give certain information about these premises. Forms of return are obtainable from local Chambers of Commerce, offices of the F.B.I. and National Union of Manufacturers, or from the Registrar of Factory and Storage Premises, Board of Trade, Millbank, London, S.W.1.

Machine Tool Electrical Equipment

The address of Mr. S. F. Steward who was recently appointed to give advice and direction with regard to electrical equipment for machine tools is Ministry of Supply (Code VA), Machine Tool Control (M.T.C. 8), 35, Old Queen Street, London, S.W.1 (telephone: Victoria 9040, Ext. 273 and 287).

Arbitration Tribunal Awards

A number of awards made during March by the National Arbitration Tribunal are reported in the April *Ministry of Labour Gazette*. One of these relates to a claim by the Amalgamated Engineering Union against Allen West & Co., Ltd., for payment of time-and-a-half to all employees who worked on Whit Monday, 1940. The Tribunal found in favour of the claim and awarded accordingly.

The Transport and General Workers' Union and the National Union of General and Municipal Workers brought a claim against the Engineers and Allied Employers' National Federation for advances in the wages of women and girls. The Tribunal decided to award increases in the national bonus for female workers of 3s. for workers of 18 years and over, 2s. for workers of 16 and under 18 years, and 1s. for those of 14 and under 16 years, the increases to operate from the first full pay period after February 16th, 1941.

A claim against W. Lucy & Co., Ltd., by the Transport and General Workers' Union for the payment of 1s. 7½d. per hour to moulders, 1s. 6½d. per hour to plate moulders and 1s. 3½d. per hour for labourers was found by the Tribunal not to have been established and an award was made accordingly.

Multi-fuel Boilers

Mention was made in our issue of May 2nd (p. 626) of six boilers installed by the South African Iron and Steel Industrial Corporation which are adaptable to the burning of coke breeze, duff coal, blast-furnace or coke-oven gas and tar. Messrs. Yarrow & Co., Ltd., now inform us that a seventh boiler of this type has been ordered and is in course of manufacture.

Change of Name

Hodges & Wells, Ltd., 42, Abbeydale Road South, Sheffield, 7, have changed their name to Wells (Electricians), Ltd.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

FLEXO tinning compound.
SALAMANDA toaster

I.M.E.A. Activities

Annual Meeting Fixed

IT has been decided to hold the annual meeting of the Incorporated Municipal Electrical Association at York on June 12th. It will be preceded by an extraordinary general meeting for the purpose of amending the articles of association. As accommodation in the city is limited members have been requested to seek quarters in Leeds or Harrogate or other towns within easy reach of York.

Rationing Forms

When preparations were being made for the rationing of electricity (a scheme that so far has not been proceeded with) electricity supply authorities were asked to prepare the necessary forms for the purpose and it was intimated that the cost of doing so would be reimbursed by the Treasury. Several members of the I.M.E.A. therefore put forward claims in respect of this expenditure but were told that the intention was to reimburse expenditure only upon completed forms and not on preparatory work. It was stated, however, that if rationing was not introduced the expenditure incurred by undertakers might require to be considered and discussed.

When representations were made by the Joint Gas and Electricity Committee the Mines Department intimated that in future it would not be responsible for the rationing of gas and electricity and expressed the view that it was unlikely that there would be a "total" rationing of the two commodities in the near future. In view of the change of policy the Department is considering the question of payment for work undertaken in the preparation of the forms.

War Damage to Service Lines

A question has arisen as to the liability for war damage to undertakers' service lines where the initial cost has been borne by one of the Services or Supply Departments. The I.M.E.A. understands that in one case the undertaker was not prepared to repair the line unless the Department concerned defrayed the cost of another service line. In the view of the Electricity Commissioners, in which the Joint Committee of Electricity Supply Association concurs, this was an expense which should have been borne by the undertaker who could claim compensation under the provisions of the War Damage Act.

Deferment of Calling-up

At a meeting between the Electricity Commissioners and representatives of the Joint Committee of Electricity Supply Associations the question of the deferment of the calling-up of two classes of employee was discussed. Those concerned are (*a*) men who were registered on February 22nd with the 19 year age group and (*b*) employees in technical grades who are carrying out contracts for the wiring and installation of war establishments and other factories of national importance directly related to the war effort.

The Commissioners appreciated that many undertakings had engaged and trained young men to act as substitutes for men already called up, but they would find some difficulty, unless exceptionally strong grounds could be advanced, for recommending the deferment of the calling-up of men in the 19 year age group. With regard to class (*b*), it was argued by the Commissioners that they could not be regarded as directly related to the maintenance of electricity supplies. They suggested that applications in respect of these men could appropriately be made through the Department for which the work was being carried out.

The Joint Committee pointed out the inconvenience to which undertakings would be put if they had to secure deferments through more than one channel and said it preferred that all such applications should be dealt with through the Commissioners, although it might be necessary for them to obtain details of the contracts upon which the men were engaged from the responsible Department. The Commissioners agreed to proceed on this basis.

Concessions for Blacked-out Premises

Two or three electricity supply undertakings are giving rebates on charges to consumers who, through air-raid damage, have boarded-up windows and are compelled to use artificial light throughout the day. The I.M.E.A. has been asked to give a lead in this question but has decided that the matter is one for decision between the supply authority and the consumer.

ELECTRICITY SUPPLY

The Glen Affric Scheme. Cookers Required at Watford.

Ashton-in-Makerfield.—MUTUAL ASSISTANCE SCHEME.—It was reported at an Urban District Council meeting that a conference had been held in Bolton to discuss the rendering of mutual assistance by the various electricity authorities in the North West and North Wales in case of serious dislocation of supplies by air raids. In view of the large area to be covered, it was agreed to divide the district into groups. It was decided that Ashton should join in the scheme.

Barrow-in-Furness.—LOANS.—The Corporation Electricity Committee has obtained sanction to borrow £25,650 for the reconstruction of the rural network, £3,000 for mains and services and £2,000 for substations.

LIBRARY HEATING. — The Corporation Library Committee has asked the surveyor to report on alternative methods of electric heating for Roose Road branch library.

Birkenhead.—COMPLETION OF RING MAIN.—The Corporation Electricity Committee has obtained sanction to borrow £10,129 for ring main completion, etc.

Bolton.—LIFT INSTALLATION.—At the request of the Ministry of Health, the Corporation Assistance Committee is to prepare a revised scheme for a lift installation at the institution.

Cheltenham.—LOAN SANCTIONED.—The Corporation Electricity Committee has obtained sanction to borrow £25,776 for trunk feeder mains, ring main cables and sub-station equipment.

Dundee. — HOSPITAL INSTALLATION. — The Public Health Department is to install electric light in ward blocks, the cholera block, and the boiler-house, etc., block.

Eccles.—INTERCONNECTION SCHEME.—The Corporation Electricity Committee has made arrangements with the Swinton and Pendlebury Corporation and the Salford Corporation for the interconnection of distributing systems.

Grampians.—COMMISSIONERS' RECOMMENDATION.—The report of the Commissioners in the private inquiry held at Edinburgh from April 15th to 25th on the Grampian Electricity Supply Draft Provisional Order, 1941, was issued on May 9th. The Commissioners found the preamble proved subject to the insertion of a clause providing that the supply of electricity generated by the Grampian Company shall be used in the first place for the benefit of the locality. The Order was opposed by, among others, Inverness Town and County Councils, the Mining Association of Great Britain, Association for the Preservation of Rural Scotland, the Highland Development League, etc. Reports by the Ministry of Aircraft Production, and the Ministry of Works and Buildings and the Minister of Labour jointly, were referred to the Commissioners. These dealt generally with the promotion in relation to the present and post-war situation, but did not contain any specific recommendations. Reports from the Scottish Home Department and the Ministry of Transport were also before the inquiry. The Commissioners found that in the Order sufficient provision was made for the accommodation of workmen. They approved of provisions for compensation water. There are no other circumstances as to which it is desirable, in the opinion of the Commissioners, that information should be given. Submitting their report to the Secretary of State, they recommend that the Order should be issued with the modifications approved by them.

Heston and Isleworth.—NEW PLANT.—The Borough Council is recommended to apply for sanction to borrow £4,975 in connection with the acquisition and installation of a 1,000-kW turbo-alternator set.

Huddersfield.—SWITCHGEAR EXTENSIONS.—Approval has been given to extensions to the switchgear.

Littleborough (Rochdale).—ALTERNATIVE SUPPLY.—The Electricity Committee recommends that application should be made for permission to connect up to the electricity supply of Breda Visada, Ltd., so as to have an alternative supply of electricity available.

London.—ST. PANCRAS.—As in consequence of evacuation and damage the sales of electricity have materially decreased, the rating officer has been asked to advise the Borough Council as to the possibility of securing a reduction in the present assessment of the undertaking.

SOUTHWARK.—The Corporation Electricity Committee is seeking sanction to borrow £2,000 for mains and services. Mains are to be extended at a cost of £1,460.

The Committee reports that the maximum demand rate is not yielding a sufficient income, as a result of the reduction in the use of electricity by certain classes of consumer, and suggests that this rate should be varied, which will have the effect of making this rate similar to the business all-in rate. Accordingly the Committee recommends that, as from the date of the March meter readings, the maximum demand rate be as follows :—4d. per kWh for the first 300 kW per kW of maximum demand per quarter (with a minimum payment of 130 kWh at 4d.) during winter quarters, and ½d. per kWh in excess ; 4d. per kWh for the first 180 kWh per kW of maximum demand per quarter (with a minimum payment of 80 kWh at 4d.) during the summer quarters, and ½d. per kWh in excess.

Notts.—LAMPS FOR WARDENS.—The County Council Emergency Committee is to purchase hand lamps and batteries for wardens at a cost of £323.

Penmaenmawr.—INCREASED CHARGES.—The Urban District Council has increased its charges for electricity as follows :—Lighting, by 1½d. per kWh, other rates, by 15 per cent.

Potters Bar.—SHELTER LIGHTING.—The Urban District Council has received approval to proceed with the installation of electric lighting and heating and other work at trench shelters at Oakmere and Highview Gardens.

Rotherham.—TRACTION SUPPLIES.—The traction feeding arrangements, now loaded to capacity, are to be improved at a cost of £850.

Scunthorpe.—SHELTER LIGHTING.—The Town Council is to ask the County Council and the Senior Regional Officer to authorise the provision of electric lighting in all school shelters in the borough area which are used by the public after school hours.

Southport.—FRINGE ORDER.—The Corporation Electricity Committee is to seek a Fringe Order to supply premises at Crossens in the area of the West Lancs R.D.C.

Stalybridge.—INCREASE IN HIRE CHARGES.—To meet the constantly increasing prices of new apparatus and maintenance costs the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board has decided to increase its charges for certain domestic electrical appliances. Breakfast cookers will in future cost 3s. 9d. per quarter for all types, instead of 2s. 8d. and 3s. 3d. for the low and high loading types respectively, while the charge for water storage heaters will be 3s. 9d. instead of 3s. 3d., with an increased installation charge of 30s. instead of 10s. The charge for wash boilers will be maintained at 3s. 3d. but if a plug is required there will be a fee of £1. There will also be a fee of 3s. 9d. payable when changes of tenancy occur in respect of electric kettles and immersion heaters. When cookers are removed from one address to another there will be 7s. 6d. to pay if there is no wiring necessary and 22s. 6d. if new wiring is required.

Stoke-on-Trent.—LOANS.—The Town Council has received sanction to borrow £10,000 for unspecified mains and services, and £2,400 for meters. Application is also to be made for additional sanction to the extent of £5,000 for new meters.

Stone (Staffs).—CONCESSIONS FOR WALTON ESTATE.—The Urban District Council has decided to reduce the minimum fixed charge of 12s. 6d. per quarter on the multi-part tariff to 8s. in respect of the flats on the Walton housing estate. A decision to cancel hire facilities has been modified to enable grillers, &c., to be provided to the tenants of the estate.

Swansea.—NO REPRESENTATION AT I.M.E.A. CONFERENCE.—With reference to the I.M.E.A. annual meeting, which as we report elsewhere in this issue, will be held at York in June, the Swansea Corporation Electricity Committee has decided that notification be sent that Swansea will not be represented. Councillor W. J. P. Webber, a member of the Committee, said at its last meeting that in his view such meetings should be suspended during the war.

Wakefield.—ELECTRICAL LABORATORY.—The Education Committee is to equip an electrical engineering laboratory (£1,099) and a mechanical engineering laboratory (£1,510) at the technical college workshops.

Warrington.—ELECTRIC PUMPS.—The Corporation Gas Committee is to purchase two "Mono" pumps with electric motors at a cost of £375.

Watford.—COOKERS REQUIRED.—The Corporation Electricity Committee is to negotiate for the purchase of cookers and if a satisfactory offer is obtained, up to 500 are to be purchased. As some of these may require reconditioning, spare parts are to be obtained.

Willesden.—INCREASE IN HIRE CHARGES.—An increase in the hire charges for apparatus by 20 per cent., and for wiring of premises by 30 per cent., on agreements completed after March 31st is recommended by the Borough Electricity Committee.

Overseas

Eire.—PROGRESS OF POULAPHOUCA SCHEME.—The Liffey hydro-electric scheme has been progressing rather slowly owing to the delay in procuring machinery and equipment. January, 1942, is mentioned as the "likely" date that the plant will be generating. The at Poulaphouca and Golden Falls are completed. The level of water has risen in the newly formed lake to the highest point allowable until the turbines are ready to function. The two steel pipe-lines down a 45 degrees incline into the turbines are actually ready for service.

Three hundred men are now engaged on the erection of the first of the two turbines and on the construction of the surge tank. The finishing touches are being put to the shells of the power and switch houses and other buildings, and some of the parts of the second turbine are already on the spot. Road builders are busy on the new diversion roads around the lake. The main bridges for the three principal roads that remain to be constructed are already terminated. The surge tank has reached the riveting stage.

The dam at Golden Falls is a mile and a half down the river from Poulaphouca. It is much smaller than the main dam. Its role is to control the flow of water into the Liffey from Poulaphouca. The second part of the Poulaphouca undertaking (the Dublin water supply scheme) is making equal progress. The pipe lines are connected and only the filter beds remain to be finished. It is hoped that this new water service will be ready before the beginning of 1942.

TRANSPORT

Manchester.—TROLLEY BUS BODY CONTRACTS.—The Corporation Transport Committee has declined to accede to a request from English Electric Co., Ltd., for an increase on the contract price for the supply of motor bus and trolley bus bodies, to cover increased labour costs and the cost of war risk insurance. No charge is however to be made to the Company in respect of the cost incurred by the Transport Department in mounting certain bus bodies or chassis delivered by the contractors.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications (1*s. each*) *can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.*2.

1939

1895. "Automatic steering gear for dirigible craft having rudders." General Electric Co., Ltd., and B. Chance. May 19th, 1939. (535689.)

19002. "Electrical musical instruments." A. H. Midgley and A. M. Midgley. June 29th, 1939. (535690.)

19533. "Bifurcated electrical contacts." G. H. Scholes & Co., Ltd., G. H. Scholes and F. J. Pearce. July 5th, 1939. (535610.)

23878. "Control of electrically operated winding or like mechanisms." British Thomson-Houston Co., Ltd., H. W. C. Liddiard and J. S. Hartshorn. August 18th, 1939. (Cognate applications, 27210/39 and 19/40.) (535732).

25660. "Lamps for signalling and similar purposes." British Thomson-Houston Co., Ltd., B. R. Davies and G. S. C. Lucas. September 12th, 1939. (Cognate application, 6930/40.) (535575).

25840. "Reflectors for electric lamps and the like." G. V. Downer. September 14th, 1939. (535694.)

25904. "Arrangements for repeater stations in electric communication systems." Siemens Bros. & Co., Ltd., and J. H. Mole. September 15th, 1939. (535618.)

27317. "Electrical contact plugs and moulding dies for their production." W. P. Herman. October 6th, 1939. (535658.)

27396. "Television systems." Marconi's Wireless Telegraph Co., Ltd. October 6th, 1938. (535578.)

27721. "Manufacture of articles of artificial resin or like thermoplastic material having an inlaid character or sign." Landis & Gyr Akt.-Ges. October 13th, 1938. (535581.)

27729. "Electric thermal storage cookers." General Electric Co., Ltd., O. W. Humphreys and L. J. C. Connell. October 12th, 1939. (535734.)

27764. "Periodic wave generator particularly for use in television." Hazeltine Corporation. November 4th, 1938. (535661.)

27788. "Apparatus for indicating and integrating maximum demands of a varying quantity." Sangamo Weston, Ltd. July 6th, 1939. (535619.)

27844. "Dial mechanisms for automatic telephony." Standard Telephones & Cables, Ltd., and B. B. Grace. October 13th, 1939. (535593.)

27849. "Pulse modulation systems." Standard Telephones & Cables, Ltd., W. A. Beatty and C. T. Scully. October 13th, 1939. (535701).

27850. "Automatic charging of secondary batteries." Standard Telephones & Cables, Ltd. (L. J. G. Nys, J. J. H. Ballet and V. C. J. Meeuws.) October 13th, 1939. (535702.)

27932. "Antenna for transmitting short radio waves." Marconi's Wireless Telegraph Co., Ltd. October 15th, 1938. (535707.)

27953. "Reactances particularly for use in connection with circuit arrangements for gaseous electric discharge lamps." British Thomson-Houston Co., Ltd., and T. H. Kinman. October 16th, 1939. (535735.)

27966. "Conversion of single-phase alternating-electric currents to two-phase currents." Westinghouse Brake & Signal Co., Ltd., S. A. Stevens and A. H. B. Walker. October 16th, 1939. (535666.)

27984. "Devices for sealing the ends of electric cables." Pyrotenax, Ltd., and G. D. Clothier. October 16th, 1939. (535736.)

28030. "Traffic control systems." Automatic Telephone & Electric Co., Ltd., T. P. Preist, G. W. Thompson and J. H. Taylor. October 17th, 1939. (535709.)

28190. "Systems for transmitting electric signals." British Tabulating Machine Co., Ltd. October 19th, 1938. (535741.)

28338. "Electrical conductors." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). October 20th, 1939. (535742.)

28558. "Electric cables." Pirelli-General Cable Works, Ltd., and H. T. Werren. October 25th, 1939. (535743.)

28559. "Electric cables." Pirelli-General Cable Works, Ltd., and H. T. Werren. October 24th, 1939. (535744.)

29058. "Electric lamps." M. H. Goldstone. October 31st, 1939. (535713.)

29547. "Electric motors." British Thomson-Houston Co., Ltd., A. H. Maggs and S-U. A. Choudhury. November 7th, 1939. (535715.)

30041. "Electro-optical control apparatus." D. Broido. November 14th, 1939. (535626.)

30180. "Hydraulic mechanism." British Thomson-Houston Co., Ltd. November 18th, 1938. (535718.)

30288. "Method of securing alignment in a plurality of resonant circuits, particularly for radio receivers." Johnson Laboratories, Inc. December 1st, 1938. (535719.)

30900. "Carbon-feeding mechanism for arc lamps." Zeiss Ikon Akt.-Ges. November 25th, 1938. (535720.)

32444. "Carrier frequency television signal translating system." Hazeltine Corporation. January 17th, 1939. (535633.)

32454. "Electrical remote-control systems." T. W. Ross, and Metropolitan-Vickers Electrical Co., Ltd. December 18th, 1939. (535634.)

1940

63. "Automatic volume control for differential radio receivers." Marconi's Wireless Telegraph Co., Ltd. December 30th, 1938. (535672.)

261. "Welding rods and alloys therefor." Mallory Metallurgical Products, Ltd. (P. R. Mallory & Co., Inc.). January 4th, 1940. (535673.)

1750. "Electric protective apparatus of the spark gap type." British Thomson-Houston Co. Ltd., and F. H. Clough. January 29th, 1940. (535679.)

2047. "Selector or distribution boxes for electric cables." Drake & Gorham, Ltd., and J. Burns. February 2nd, 1940. (535680.)

3393. "Time lag overload tripping gear for use more especially in connection with circuit breakers." Electric Construction Co., Ltd., and E. N. Crosby. February 23rd, 1940. (535685.)

6039. "Amplifying systems comprising a number of class B amplifiers." Philips Lamps, Ltd. April 6th, 1939. (535750.)

8452. "Clutches." Standard Telephones & Cables, Ltd., G. H. W. Woolley and M. W. Henderson. August 15th, 1939. (Divided out of 23545/39.) (535728).

8640. "Core covering apparatus." Standard Telephones & Cables, Ltd. May 20th, 1939. (535604.)

9004. "Audiphones." Electrical Research Products, Inc. June 20th, 1939. (535753.)

9569. "Electric switches and contacts therefor." W. A. McNeill, G. Pailin and Ferguson Pailin, Ltd. May 31st, 1940. (535643.)

9747. "Traffic control systems." Automatic Telephone & Electric Co., Ltd., and G. W. Thompson. June 4th, 1940. (535647.)

10207. "Self-generating gas-blast electric circuit-breakers." British Thomson-Houston Co., Ltd. June 13th, 1939. (535756.)

1941

1675. "Method of controlling flow in an electron stream and electron discharge apparatus." A. H. Stevens. (Board of Trustees of Leland Stanford Junior University.) August 9th, 1939. (Divided out of 534144.) (Convention date not granted.) (535767.)

Lightning Studies

Tests and Records

THE series of articles by Mr. John F. Shipley (consulting engineer) published in *Distribution of Electricity* has been reprinted in booklet form (48 pages and 27 illustrations). Its four chapters are concerned with heat and frontal storms, followed by examples of lightning storms, with concluding evidence and comment. An attempt is made to produce an orderly picture of the complex internal structure of a storm, which is usually described as turbulence, with comment on existing ideas and evidence in support of the author's explanations of some of the various types of lightning flashes.

Almost all theories about the separation of electricity in storms have implied that outside the main central vortex there is a great region of stillness forming the bulk of the storm cloud. In that quiet zone even very small raindrops are supposed to fall and large ones to overtake them, apparently vertically, while snow crystals in needle and plate forms are thought to fall slowly down with a to-and-fro motion.

The author is not prepared to agree with the assumption that vertical downward motion can take place quietly. If snow must be produced before condensation into liquid drops can take place, then it seems to him that it must be necessary for the snow to circulate in all directions through the cloud in order to make rain. This could not easily be done, he states, without some circulation of the type which he indicates.

In the April *Journal* of the INSTITUTION OF ELECTRICAL ENGINEERS (Part II, Power Engineering, Vol. 88) there is an account of an investigation conducted by Mr. F. R. Perry (Metropolitan-Vickers Electrical Co., Ltd.) into the magnitudes of lightning voltages and currents, measured on a 40 kV transmission line of the Victoria Falls and Transvaal Power Co. and later on a 33 kV overhead line of the Nigerian Electricity Supply Corporation's system.

The apparatus employed consisted of (*a*) high-speed continuously evacuated cathode-ray oscillograph, (*b*) klydonograph, (*c*) magnetic links for measuring current flow. The results are analysed and compared with similar records obtained in other parts of the world. While extreme values of voltage, or current, or voltage steepness were not recorded in South Africa or Nigeria, magnitudes agreed well with those determined in America and Switzerland. Therefore line operating conditions in storm areas there must be governed by the same rules as are found to prevail in other regions.

The same I.E.E. *Journal* contains a short contribution from Mr. R. H. Golde on the validity of lightning tests with scale models, being an official E.R.A. communication (report S/T38, British Electrical & Allied Industries Research Association, 15, Savoy Street, London, W.C.2).

The conclusion is that model tests cannot be accepted as they stand, which view is confirmed by the fact that such tests suggest a protective ratio of lightning rods of between one and two, whereas statistical survey of buildings damaged in the neighbourhoods of tall church steeples indicates that the protective ratio is actually only of the order of unity.

FINANCIAL SECTION

Company News. Liquidations and Bankruptcies. Stock Exchange Activities.

Reports and Dividends

Walsall Conduits, Ltd., report a net profit, before tax, of £171,713, as compared with £162,092 for 1939. Provision for tax requires £84,962, reserve receives £20,000 and the ordinary dividend for the year is maintained at 55 per cent., by the final distribution of 35 per cent. The balance carried forward is £72,831, as compared with £55,517 brought in.

Sangamo Weston, Ltd., reports that after providing £25,573 for tax, the net profit for 1940 is £16,392 (against £33,672 for 1939). The dividend for the year is 10 per cent. (against 5 per cent.), and £88,340 is carried forward (against £79,822). No allocation is made to general reserve which in the previous year received £20,000.

The Ever Ready Co. (Great Britain), Ltd., reports a slightly lower profit (£621,440) for the past year, after meeting E.P.T. As already reported, the dividend is maintained at 40 per cent., £100,000 is put to general reserve and £50,000 for contingencies.

Laurence, Scott & Electromotors, Ltd.—The net profit for 1940 was £119,177, against £123,314 for 1939. The dividend on the "A" and "B" ordinary shares is maintained at 15 per cent. Provision for income tax is raised from £30,000 to £55,000 and the sum put to reserves from £10,238 to £10,243.

Hopkinsons, Ltd., report that the profits increased from £209,131 for 1939–40 to £240,600 for the year ended January 31st. This increase was more than offset, however, by the rise in taxation from £104,187 to £186,495. No allocation is made to general reserve (against £50,000 a year ago), and the ordinary dividend for the year is maintained at 15 per cent., by a final payment of 10 per cent. The balance carried forward is £56,545 (against £44,090 brought in).

Tube Investments, Ltd., is paying an interim dividend on the ordinary stock of 10 per cent., and at the same rate relatively on the liaison ordinary shares.

McMichael Radio, Ltd., reports a profit of £25,927 for 1940, as compared with a loss of £6,905 for 1939. After providing £15,000 for taxation, the debit balance carried forward is reduced to £25,422.

Babcock & Wilcox, Ltd., report a profit for 1940 of £717,347, a decrease of £39,316 as compared with the preceding year. The dividend for the year is maintained at 11 per cent.

The Calcutta Electric Supply Corporation, Ltd., has announced a final dividend of 3 per cent. (against 4 per cent.), making 7 per cent. for the year, tax free (against 8 per cent, tax free).

Richard Johnson & Nephew, Ltd., are maintaining their ordinary dividend for the year at 9 per cent.

The St. Austell & District Electric Lighting and Power Co., Ltd., is paying a final dividend of 6 per cent., making 10 per cent. for the year (unchanged).

Tecalemit, Ltd., has declared an interim dividend of 6 per cent. No interim was paid a year ago, but the final payment was 18 per cent.

Ransomes, Sims & Jefferies, Ltd., are maintaining their ordinary dividend at 7½ per cent. for the year.

John I. Thornycroft & Co., Ltd., are paying an interim dividend of 5 per cent. No interim was paid in the previous year, but the final distribution was 10 per cent.

The Associated Equipment Co., Ltd., is again paying an ordinary interim dividend of 2½ per cent., tax free.

The Rawlplug Co., Ltd., is paying a final dividend of 30 per cent., making 40 per cent. for the year (unchanged).

The West London & Provincial Electric & General Trust, Ltd., has announced a final dividend of 3½ per cent. (against 4 per cent.), making 5½ per cent. for the year (against 6 per cent.).

The British Electric Traction Co., Ltd., reports a revenue for the year ended March 31st of £748,552, as compared with £745,874 for 1939-40, and a net profit of £531,824 (against £548,748). The final dividend on the participating preference stock is 5 per cent., making 8 per cent. for the year (same), and the final on the deferred ordinary stock is 30 per cent., again making 45 per cent. for the year. The balance carried to undivided profits account is £12,864.

New Companies

Industrial Magneto Co., Ltd.—Private company. Registered April 30. Capital £1,000. Objects: To carry on the business of manufacturers of and dealers in magnetos, dynamos motors, armatures, batteries, conductors, insulators, transformers, electrical plant, etc. Subscribers: C. B. Jarman, 2, Kingshill Drive, Kenton, Harrow, Middlesex, and G. Wigney, 1, Frobisher Close, Pinner, Middlesex. Solicitors: Hyman Isaacs & Co., 7–8, Thavies Inn, E.C.1.

Coley Electrical Instruments, Ltd.—Private company. Registered April 26th. Capital £4,000. Objects: To carry on the business of manufacturers of and dealers in electrical, optical, surgical, curative, scientific and drawing instruments, X-ray tubes and apparatus, hospital equipment, etc. Directors: R. J. Coley, "Bracondale," The Gardens, Lamas Lane, Esher, Surrey, and M. G. Bryan, 48, Woodlands Road, Isleworth, Middlesex. Registered office: 2–4, London Road, Brentford, Middlesex.

Modern Utilities, Ltd.—Private company. Registered May 3rd. Capital £1,000. Objects: To carry on the business of manufacturers of and dealers in wireless, magnetic, electrical, television and telegraphic apparatus, accessories and materials, etc. Directors: H. J. Gaisford, E. G. Gaisford and E. H. Bird. Solicitors: Reynolds and Co., 26, Budge Row, E.C. 4.

Companies' Returns

Statements of Capital

Sun Electrical Co., Ltd.—Capital £250,000 in 125,000 7½ per cent. preference and 125,000 ordinary shares of £1 each. Return dated January 3rd, 1941. 125,000 preference and 93,311 ordinary shares taken up. £218,311 paid. Mortgages and charges: Nil.

C. J. Ferguson & Sons, Ltd.—Capital £5,000 in 2,500 preference and 2,500 ordinary shares of £1. Return dated December 31st, 1941. 2,500 preference and 1,802 ordinary shares taken up. £2,802 paid on 1,000 preference and 1,802 ordinary shares. £1,500 considered as paid on 1,500 preference shares. Mortgages and charges: Nil.

Donovan Electrical Co., Ltd.—Capital £50,000 in 50,000 shares of £1 each. Return dated January 10th, 1941. 29,100 shares taken up. £29,100 considered as paid. Mortgages and charges: Nil.

Power Centre Co., Ltd.—Capital £5,000 in £1 shares. Return dated January 1st, 1941. 3,614 shares taken up. £2,114 paid. £1,500 considered as paid. Mortgages and charges: £1,000.

Astor Electric Lamps, Ltd.—Capital £200 in 200 shares of £1 each. Return dated December 4th, 1940. 150 shares taken up. £150 paid. Mortgages and charges: Nil.

Mortgages and Charges

Electricars, Ltd.—Satisfaction in full on October 24th, 1940, of debenture dated August 14th, 1928, and registered August 15th, 1928, securing £2,000. (Notice filed April 25th, 1941.)

London Transformer Products, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated April 7th, 1941, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Kingsway Electricals (1938), Ltd.—Particulars filed of debentures not exceeding £1,000, authorised March 15th, 1941, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £500.

Makers Agents, Ltd. (formerly Electrical & Radio Research, Ltd.)—Particulars filed of £2,000 debentures authorised March 28th, 1941, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Milnes Electrical Engineering Co. (Bingley), Ltd.—Mortgage on moneys due under a contract, dated April 14th, 1941, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Receiver Appointed

Whitehead Switchgear and Inventions, Ltd.—E. T. Granger, of 11, Ironmonger Lane, E.C. was appointed receiver on April 24th, 1941, under powers contained in debenture dated April 11th, 1940.

Liquidations

G.V.D. Illuminators, Ltd., illuminating engineers, Aldwych House, Aldwych, London, W.C.—Pursuant to Section 238 of the Companies Act, 1929, a meeting of creditors was held recently at Aldwych House, London, W.C. The statement of affairs disclosed liabilities of £5,550, while the assets comprised cash in hand £2; book debts, £174; stock-in-trade, at cost, £2,250, put down at £500; and fixtures, fittings, etc., £100, making a total of £776, leaving a deficiency, as regarded the creditors, of £4,774. At a previous meeting of the creditors it was stated that the company was registered in November, 1934, with a nominal capital of £20,000, all of which had been issued. At that meeting it was decided that steps should be taken to place the company into voluntary liquidation. Mr. Wm. Nicholson, 32a, Weymouth Street, London, W.1, was appointed to act as liquidator of the company, and a committee of three of the creditors was also appointed.

Forward Electric Co., Ltd.—Meeting June 10th at 95, New Street, Birmingham, to receive an account of the winding-up by the liquidator, Mr. A. Cripwell.

Bankruptcies

A. Austin, 60, Vaughan Road, Harrow, lately trading as Alfred Austin & Sons, at 109, Headstone Road, Harrow, electrical and radio dealer.—This debtor applied for his discharge at the London Bankruptcy Court on May 7th before Mr. Registrar Kean. The Official Receiver reported that the debtor failed in March, 1939, with liabilities of £940, and the assets had realised £7. The discharge was granted subject to a suspension of fifteen months.

A. Lawson, formerly A. Lotterman, electrical engineer, 261, Park West, Edgware Road, London, W.1.—Receiving order made April 24th on debtor's own petition.

S. D. C. Orchard, electrical engineer (trading as Empire Radio), 43, Malmesbury Road, Shirley, Southampton.—Application for discharge to be heard on June 10th at the Castle, Winchester.

T. W. Dennison (T. W. Dennison & Co.), electrical and radio engineer, 40, Thornton Road, Bradford.—Trustee, Mr. W. F. Cresswell, 71, Manningham Lane, Bradford, Official Receiver, released May 1st.

R. W. Bradley and **B. R. Bradley** (W. Bradley & Sons), electrical contractors, 75, York Road, Woking.—First and final dividend of 4½d. in the £1 payable May 16th at 4, Bucklersbury, London, E.C.4.

H. J. Fowlie, electrical engineer, 40, Queen Street, Maidenhead.—First and final dividend of 4½½d. in the £, payable at 8, Forbury, Reading.

STOCKS AND SHARES

TUESDAY EVENING.

THE tone of Stock Exchange markets is quick to respond to encouraging development in war news. During the past few business days various items bearing upon the situation have been read as favourable to the cause, and, while business remains exceeding quiet in most Stock Exchange securities, the disposition of prices is to harden in most cases where changes occur.

The incidence of heavier taxation is a constant reminder of the weight which the war imposes upon profits. A striking example is to be seen in the accounts of Hopkinsons. Reference was made last week to the increase of £31,500 in the net trading profit, before tax, for the year ended January 31st last. The report shows that an additional £82,000 has been provided for taxation and E.P.T., the result being that the year's available profit of £74,000 is actually £30,000 lower than that of the preceding year. The dividend, as already stated, is maintained at 15 per cent. This is only one instance of many examples which can be quoted as illustrating war effects. The report and accounts of Cable and Wireless are awaited with more interest than usual. The delay, due to war conditions, in collecting data essential to making up the figures for the year, has put an edge upon expectation.

Electricity Supply Shares

To what extent the war will react upon this year's profits of industrial undertakings is a problem concerning which a man needs to be very brave or very rash to prophesy. Shares in the best Home electricity supply companies are amongst the safest investments that Stock Exchange markets can offer ; the stability of their financial—and physical—foundations is recognised in the comparatively high prices which the shares command. But whether the companies will be able to maintain their usual dividends for the current year is a question to which any answer will be no more than guesswork. Moreover, a full ten months must run before the companies will announce their results for 1941. Accordingly, the necessary policy of wait and see finds reflection in a market condition where prices seldom undergo material alteration. Ex dividend markings may—though they rarely do—lead to prices being normally lowered by the cash amount of the dividend. Proprietors are content to "see the thing through." Shares come in every now and then from executors who sell on behalf of deceased accounts. When this happens, the stock is usually snapped up either by investors or by bears who have been caught out. In this week's list of share prices in the Home electricity group not a single change has to be recorded.

Tax-free Dividends

The inadvisability of banking upon repetition of previously-paid rates of dividend declared free of tax, was recently mentioned here. The Calcutta Electric Supply Company has announced a reduction of 1 per cent., making the year's dividend 7 per cent. tax free; this came as no surprise. Taxation has reached a record level so far as this country is concerned, and the effect of the burden is daily making itself more felt. Yet the prices of securities suffer little decline, the reason being that investment elects to regard present-day sacrifices as being both essential and abnormal. There is no pressure to sell. A price may go back following upon a lower dividend than before, but it recovers, in the majority of cases, when the market perceives the philosophy with which the reduction is accepted by shareholders. Calcutta Electrics are unaltered at 37s.

Home Railways Advance

Prices in the Home Railway market are pursuing a switchback course which, this month, is in favour of stockholders. Last week's rises in Southern Railway issues have been carried further. The 5 per cent. preferred has advanced to 50½, a gain of two points; the company's 5 per cent. preference, at 93½, is three up. London Passenger Transport "C" remains at 31. The award of the Tribunal in connection with the men's claim for a fresh increase of 10s. a week in wages is expected to be made public almost at once. If the claim is allowed in full, the increased annual cost to the railway companies is estimated as likely to prove between £16½ and £17 million. During the time in which negotiations have been in progress between the companies and the men, investment has taken a fairly active interest in Home Railway stocks. The prior-charge issues have been supported by the strength of gilt-edged stocks. The junior issues have attracted, and continue to attract, attention from the more speculatively-minded buyer content to run a certain degree of risk in order to obtain the high yields which these stocks offer under present conditions.

Anglo-American Telegraph Company

The Anglo-American Telegraph Company, which holds its meeting this week, shows in its annual report that the dividends on the ordinary, preferred and deferred stocks equal the annual rental receivable from the Western Union Telegraph Co. under lease. The 6 per cent. preferred stock has for long occupied a high position amongst the industrial securities upon which the yield is reasonably good, while the return on the deferred, at present £6 7s. 6d. per cent., appeals to the investor to whom the speculative flavour is compensated for by the amount of yield.

The Anglo-American Telegraph capital is £7 millions, and the company has leased all its cables to the Western Union Telegraph Company. The rental paid by the latter forms the income from which the dividends on Anglo-American Telegraph stocks are paid. Whenever the renewal fund stands at less than a million pounds, its income is to be added to it, and the Western Union Co. is to contribute to it £20,000 per annum. When the renewal fund stands at more than a million pounds, the Anglo-American Telegraph income will belong to the Western Union. At present, there is no balance on this renewal account, expenditure having exceeded the amount of the fund and contributions.

All but £205,000 of the Anglo-American Telegraph capital is in 6 per cent. non-cumulative preferred ordinary and deferred ordinary, in equal amounts. Both these stocks have received their due dividends of 6 per cent. and 1½ per cent. respectively for many years. The present price of the deferred stock, 23½, compares with the lowest touched during the past decade of 17 in 1939 and the highest of 32 in 1936. At one time a popular counter, the deferred stock is now a steady-going speculative investment, while the preferred, as already mentioned, has a large proprietary of investors by whom it is regarded as satisfactory.

Babcock & Wilcox

Babcock & Wilcox have declared a dividend and bonus making, in all, 11 per cent. for the year, the same as that for the previous twelvemonth. This occasioned mild surprise in the Stock Exchange market, because the telegram announcing it, and exhibited in the market, showed the profit for 1940 to be £717,347, or nearly £40,000 less than that of the comparable period, when the same dividend was earned with no more than a narrow margin. The full report is awaited with considerable attention, Babcock & Wilcox shares being amongst the front-rank industrials to which investment turns for a 5 per cent. yield on its money. The price of the shares is unchanged at 39s. 6d.

Miscellaneous Matters

Cable and Wireless stocks remained a firm market up to the declaration of the dividend, the preference being once more within a point of par, and the ordinary 10s. better on the week at 62½. In the foreign groups, Jerusalem Electric shares eased off to 20s. and Palestine Electric "A" failed to recover from their fall to 16s. 3d. which occurred last week.

Among manufacturing shares, Telegraph Constructions rose 2s. 6d. to 40s., Reyrolle strengthened to 51s. 3d., Murex to 81s. 3d., Mather & Platt to 37s. 6d., and Lucas to 57s. 6d. Telegraph Condensers held their last week's rise of 5s. Ever Ready are 3d. better at 26s. 3d. There has been a little more inquiry for Vickers, as a few pence rise in the price to 15s. reflects. British Electric Traction deferred at 750 is unaffected by the declaration of a 30 per cent. dividend, making 45 per cent. for the year, the same as that for 1939. The stock, allowing for inclusion of the dividend in the price, gives a return of £6 2s. 5d. per cent. Cable & Wireless stocks are both a point higher.

Thanks to the various Vesting Orders of the Treasury, a good part of the holdings of American dollar securities which were previously in the hands of British investors, has now passed out of the possession of those holders, most of whom have received—incidentally—better prices than they would have obtained had the shares been held to the present time. The transfer of the shares was compulsory, and doubtless many, if not most, of the holders would have refused to part from their investments had it not been necessary to do so in the national interest. As things have turned out, it is as well for them that they were given no option.

Wall Street Sluggishness

The sluggishness of the American market is a matter for constant surprise to people whose memories go back to the last war, when American dollar stocks and shares went soaring in price; when dividends were constantly increased; and when the American market as a whole was one of the few active departments for security dealing. In this present war, however, American control over earnings and profits is so much tighter than it was before, that the profits are severely curtailed. As a consequence, the American investor and speculator are leaving the market alone. Taxation across the Atlantic is extremely high, and this, combined with the check upon profits, has reduced the Wall Street market to a condition of quietude not unlike that which prevails in the London Stock Exchange.

I.E.E. Informal Meetings

THE INSTITUTION OF ELECTRICAL ENGINEERS has found it possible to arrange two informal meetings, and it is hoped by the Council and the Informal Meetings Committee that members will take this opportunity of keeping in touch with Institution activities and meeting their fellow members. The meetings will be held at 6.30 p.m. At the first, on May 26th, there will be a discussion on "Looking Forward," to be opened by the President, Mr. J. R. Beard, M.Sc. The other, on June 30th, will be devoted to a discussion on "The Continuity of Essential Electrical Services under Present Conditions," to be opened by Mr. A. J. Gibbons, B.Sc.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1941 High-est	1941 Low-est	Dividend Pre-vious	Dividend Last	Middle Price May 13	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole ..	48/6	45/–	15	12½	46/3	..	5 8 3
British Power and Light ..	27/9	23/–	7	6	24/6	..	4 18 0
City of London	22/6	20/–	7½	7	21/3	..	6 11 9
Clyde Valley	36/6	33/6	8	8	35/–	..	4 11 5
County of London	34/6	30/–	10½	8	30/–	..	5 6 8
Edmundson's :							
7% Pref.	30/–	25/6	7	7	30/–	..	4 13 4
Ord.	25/6	23/6	6	6	25/6	..	4 14 0
Elec. Dis. Yorkshire ..	39/–	36/–	9	9	38/9	..	4 12 9
Elec. Fin. and Securities ..	40/–	39/–	12½	12½	40/–	..	6 5 0
Elec. Supply Corporation ..	37/9	36/–	11½	10	37/6	..	5 6 8
Isle of Thanet	8/–	6/–	2	Nil	7/–	..	—
Lancs Light and Power ..	31/6	28/6	7½	7½	31/3	..	4 16 0
Llanelly Elec.	21/–	19/6	5½	5½	20/–	..	5 10 0
Lond. Assoc. Electric ..	16/6	12/6	5½	4½	15/9	..	5 14 3
London Electric	23/6	21/3	7	7	22/6	..	6 4 5
London Power Deb. Red. ..	105½	102	5	5	103	+½	4 17 1
Metropolitan	34/6	31/–	10	8	31/3	..	5 2 3
Midland Counties	35/6	32/9	8	8	35/–	..	4 11 5
Mid. Elec. Power	35/–	33/3	9	9	35/–	..	5 2 10
Newcastle Elec.	26/3	24/6	7	7	25/–	..	5 12 0
North Eastern Elec.:							
Ordinary	29/–	25/6	7	7	27/6	..	5 1 10
7% Pref.	32/6	29/–	7	7	32/6	..	4 6 2
Northampton	2½	39/6	10	10	41/3	..	4 17 0
Notting Hill 6% Pref. (£10).	9	8	6	6	8½	..	—
Northmet Power :							
Ordinary	34/6	28/6	10	7	28/9	..	4 17 4
6% Pref.	29/6	27/3	6	6	29/–	..	4 2 9
Richmond Elec.	19/–	18/–	6	6	18/9	..	6 8 0
Scottish Power	36/6	33/–	8	8	36/3	..	4 8 5
Southern Areas	16/6	14/6	5	5	16/3	..	6 3 0
South London	20/–	19/3	7	7	20/–	..	7 0 0
West Devon	21/6	20/9	5	5	21/3	..	4 14 1
West Glos.	18/3	17/3	4½	4½	17/6	..	5 2 10
Yorkshire Elec.	38/3	34/6	8	8	38/3	..	4 4 0
Overseas Electricity Companies							
Atlas Elec.	2/6	1/9	Nil	Nil	2/–	..	—
Calcutta Elec.	37/3	33/–	8*	7*	37/–	..	3 15 8
Cawnpore Elec.	30/–	26/–	10	10	27/6	..	7 5 9
East African Power ..	25/6	21/6	7	7	25/–	..	5 12 0
Jerusalem Elec.	22/6	19/3	7	7	20/–	−½	7 0 0
Kalgoorlie (10/–)	12/6	11/–	7½	7½	12/6	..	6 0 0
Madras Elec.	25/3	23/6	8*	6*	23/9	..	—
Montreal Power	31	24	1½	1½	25	+½	6 0 0
Palestine Elec. "A" ..	20/6	16/–	Nil	Nil	16/3	..	—
Perak Hydro-electric ..	18/3	16/3	2½	6	17/6	..	6 17 2
Shawinigan Power ..	18½	15	83cts.	90cts.	15	..	—
Tokyo Elec. 6%	40½	36	6	6	37½	..	16 0 0
Victoria Falls Power ..	76/6	69/6	15	15	73/9	..	4 1 4
Whitehall Investment Pref.	14/9	8/3	7½	7½	8/9	..	9 17 3
Public Boards							
Central Electricity :							
1950–70	110½	108	5	5	110½	..	4 10 6
1955–75	113½	109½	5	5	113	..	4 8 6
1951–73	108	105½	4½	4½	108	..	4 3 4
1963–93	101	94	3½	3½	100	..	3 10 0
1974–94	93	87½	3½	3½	93	..	3 10 0
London Elec. Trans. Ltd. .	94	91½	2½	2½	94	..	2 13 2
London & Home Counties							
1955–75	108	106	4½	4½	108	..	4 3 4
Lond. Passenger Transport :							
A	120	109	4½	4½	119½	..	3 15 4
B	114	102½	5	5	112½	..	4 9 0
C	36	29	1½	3	31	..	9 13 6
West Midlands Joint Elec.							
1948–68	108	103	5	5	107½	..	4 13 0
Telegraph and Telephone							
Anglo-Am. Tel. :							
Pref.	102½	99	6	6	102½	..	5 17 1
Def.	24	22	1½	1½	23½	..	6 7 8
Anglo-Portuguese	17/6	12/6	8	8	12/6	..	12 16 0
Cable & Wireless :							
5½% Pref.	102	93	4½	5½	99	+1	5 11 1
Ord.	63	52½	4	4	63	+1	6 7 0
Canadian Marconi $1 ..	5/–	4/–	Nil	4cts.	5/–	..	3 4 0
Globe Tel. & Tel. :							
Ord.	29/–	26/–	7½*	6*	28/9	..	4 3 6
Pref.	27/6	25/–	6	6	27/6	..	4 7 3
Great Northern Tel. (£10) ..	14	10½	20	20	12½	..	—
Inter. Tel. & Tel.	3½	2½	Nil	Nil	3	..	—
Marconi-Marine	23/–	19/9	10	7½	22/6	..	6 13 2
Oriental Telephone Ord. ..	55/6	47/–	12*	11½*	2¾	..	4 3 8
Telephone Props.	11/6	11/–	6	6	11/3	..	10 13 4
Telephone Rentals (5/–) ..	7/9	6/9	10	10	7/3	..	6 18 0

Company	1941 High-est	1941 Low-est	Dividend Pre-vious	Dividend Last	Middle Price May 13	Rise or Fall	Yield p.c. £ s. d.
Traction and Transport							
Anglo. Arg. Trams :							
First Pref. (£5)	2/3	1/–	Nil	Nil	2/–	..	—
4% Inc.	8½	4	Nil	Nil	4½	..	—
British Electric Traction :							
Def. Ord.	830	740	45	45	750	..	6 2 5
Pref. Ord.	167	150	8	8	160	..	5 0 0
Bristol Trams	40/–	36/–	8*	8	36/3	..	4 8 5
Brazil Traction	8	6½	$1	50c.	6½	−½	—
Calcutta Trams	19/9	18/6	8	5½	19/–	..	5 17 8
Cape Elec. Trams	17/6	16/6	5	5	17/–	..	5 17 4
Lancs Transport	39/–	36/–	10	10	38/9	..	5 3 1
Mexican Light :							
1st Bonds	40	34½	5	5	40	..	—
Rio 5% Bonds	85½	84	5	5	85	..	5 17 8
Southern Rly. :							
5% Prefd.	53½	43½	5	5	50½	+2	9 18 0
5% Pref.	94	77½	5	5	93½	+3	5 7 0
T. Tilling	43/6	34/6	10	10	42/6	..	4 14 0
Tilling & B.A.	47/6	45/6	8*	7*	45/9	..	3 1 2
West Riding	36/–	34/–	10	10	36/–	..	5 11 1
Equipment and Manufacturing							
Aron Electricity Ord. ..	18/6	10/–	15	Nil	18/–	..	—
Assoc. Elec. :							
Ord.	41/–	38/3	10	10	40/–	..	5 0 0
Pref.	36/–	33/3	8	8	35/–	..	4 11 5
Automatic Telephone & El.	47/3	32/–	12½	12½	41/3	..	6 1 1
Babcock & Wilcox ..	43/3	39/–	10	11	39/6	..	5 11 4
British Aluminium ..	43/6	39/–	12½	10	40/–	..	5 0 0
British Insulated Ord. ..	88/3	78/9	20	20	82/6	..	4 17 0
British Thermostat (5/–) ..	12/3	10/6	18½	18½	12	..	7 14 2
British Vacuum Cleaner (5/–)	6/3	6/–	40	12½	6/3	..	10 0 0
Brush Ord.	4/3	3/6	Nil	Nil	4/–	..	—
Callender's	65/6	58/6	15	15	61/3	..	4 17 9
Chloride Elec. Storage ..	63/6	60/–	15	15	62/6	..	4 15 10
Consolidated Signal ..	65/–	63/6	17	17	62/6	−½	5 8 7
Crabtree (10/–)	23/9	21/3	17½	17½	22/6	..	7 15 7
Crompton Parkinson :							
Ord. (5/–)	19/–	17/9	30	20	18/9	..	5 6 8
E. K. Cole (5/–)	4/9	2/9	10	Nil	4/6	..	—
Elec. & Muzical Industries (10/–)	8/6	7/3	5	Nil	7/6	..	—
Electric Construction ..	27/6	25/–	13½	10	27/6	..	7 5 6
Enfield Cable Ord. ..	51/–	45/–	16½	12½	45/–	..	5 11 3
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	..	5 0 0
English Electric	31/6	29/–	10	10	31/3	..	6 8 0
Ensign Lamps (5/–) ..	16/3	15/–	25	25	15/–	..	8 6 3
Ericsson Tel. (5/–) ..	37/3	35/–	25*	22*	35/–	..	3 2 10
Ever Ready (5/–)	27/6	25/–	40	40	26/3	+3d.	7 12 0
Falk Stadelmann	16/9	13/9	6	7	15/9	..	8 17 10
Ferranti Pref.	25/6	23/6	7	7	25/–	..	5 12 0
G.E.C. :							
Pref.	33/–	30/6	6½	6½	32/6	..	4 0 0
Ord.	81/–	77/–	20	20	80/–	..	5 0 0
Greenwood & Batley ..	21/–	18/6	15	13	20/–	..	13 0 0
Hall Telephone (10/–) ..	13/–	10/–	15	10	12/6	..	8 0 0
Henley's (5/–)	21/6	19/6	20	20	20/–	..	5 0 0
4½% Pref.	21/6	20/–	4½	4½	21/3	..	4 4 8
Hopkinsons	41/6	37/6	15	15	41/3	..	7 5 4
India-Rubber Pref. ..	21/6	19/6	5½	5½	21/3	..	5 3 6
Intl. Combustion	92/6	81/3	32½	30	92/6	..	6 13 4
J. Lucas	58/–	50/6	15	15	57/6	+½	5 4 4
Johnson & Phillips ..	48/3	43/–	12½	15	43/9	..	6 17 0
Lancashire Dynamo ..	53/6	50/–	25	25	52/6	..	9 10 11
Laurence, Scott (5/–) ..	10/–	7/–	15	15	9/6	..	7 17 10
London Elec. Wire ..	25/6	20/–	7½	7½	22/6	..	6 13 4
Mather & Platt	37/9	32/–	13½	10	37/6	+6d.	5 6 8
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	..	5 3 6
Murex	84/6	75/–	20	20	81/3	+½	4 18 6
Pye Deferred (5/–) ..	11/6	10/9	25	25	11/3	..	11 2 2
Revo (10/–)	21/3	18/9	17½	5	20/9	..	2 8 4
Reyrolle	52/6	47/9	12½	12½	51/3	+½	4 17 6
Siemens Ord.	20/9	17/–	7½	7½	20/–	..	7 10 0
Strand Elec. (5/–) ..	2/–	1/–	4	2	2/–	..	5 0 0
S. Smith (1/–)	7/9	5/9	37½	50	6/3	..	8 0 0
Switchgear & Cowans (5/–)	9/–	7/9	10	15	8/9	..	8 11 6
Telegraph Condenser (10/–)	12/6	7/–	Nil	5	12/6	..	4 0 0
Telegraph Construction ..	39/–	34/6	10	10	40/–	+½	5 0 0
Telephone Mfg. (5/–) ..	7/6	6/9	9	9	7/3	..	6 4 2
Tube Investments	92/6	89/–	23½	23½	90/–	..	5 5 9
Vactric (5/–)	2/3	2/–	4	Nil	2/3	..	—
Vickers (10/–)	16/–	14/–	10	10	15/9	+3d.	6 13 4
Ward & Goldstone (5/–) ..	19/9	12/6	20	20	16/6	..	5 19 9
Westinghouse Brake ..	42/6	39/6	17½	10	39/6	..	5 1 3
Walsall Conduits (4/–) ..	26/6	24/6	55	55	26/3	..	8 7 6
West, Allen (5/–)	4/3	3/6	7½	7½	3/9	..	10 0 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Tenders Invited and Accepted. Schemes Promising Electrical Work.

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Atherton.—May 17th. Electricity Department. Cast-iron concentric cable service boxes, and house service type quarterly prepayment meters. Particulars from the electrical engineer, Electricity Department, Factory Street.

Bentley-with-Arksey.—May 17th. Urban District Council. Two electric motors and switchgear at the sewage pumping station. Specification, schedule and form of tender from R. N. Penlington, engineer and surveyor, Council Offices, Cooke Street. (Deposit: £1 1s.)

Bridgend.—May 21st. Electricity Department. E.h.v. switchgear, transformers, e.h.v. and l.v. cables. (April 25th.)

Cork.—May 24th. North Cork Board of Health and Public Assistance. Supply and installation of mechanical equipment, electric motors and pumps, and other appliances at Kanturk. Plans and specifications from D. C. Murphy, secretary, County Hospital, Mallow.

Manchester.—May 19th. Town Council. Renewal of a portion of condenser coils at Cold Stores. Specification and form of tender on application to the General Manager, Markets Department, Town Hall.

Newcastle-on-Tyne.—May 24th. Health Committee. One motor-driven counterweighted Bucky table, and one four-valve diagnostic X-ray unit. Specification and form of tender from the Medical Officer of Health, Health Department, Town Hall.

New Mills.—June 2nd. Electricity Department. 10-kV cables. (See this issue.)

Salford.—June 2nd. Electricity Department. Twelve-panel switchboard for 400-V, 15,000-kVA service. (See this issue.)

South Africa.—DURBAN.—City Council. June 20th. Lightning arrestors, pole fuses, l.v. insulators, enamelled shades and sodium vapour lamps. Battery charging plant and electrical test bench.

July 4th. Five 15-kVA transformers.

June 6th. 33 kV 3-phase air-break switches and equipment. (Contract E.2025).

JOHANNESBURG.—City Council. June 7th. Electric lighting fittings for Art Gallery. Low-voltage insulators.

PORT ELIZABETH.—City Council. July 24th. Cable, copper wire and house service cut-outs.

Walsall.—June 5th. Electric Supply Department. Three 500-kVA transformers. (See this issue.)

West Midlands.—May 28th. Joint Electricity Authority (Shropshire Distribution Area). Two 7,500-kVA and two 2,000-kVA transformers. (May 2nd.)

May 30th. 12,000-kVA transformer. May 9th.)

June 4th. Supply, delivery, erection, laying and testing of 33,000 V overhead steel lower transmission line and 33,000 V, 6,600 V and 400 V underground cable in connection with the Wolverhampton—Cannock—Chasetown power transmission line. (See this issue.)

Orders Placed

Birkenhead.—Electricity Committee. Accepted. Transformers—Bryce Ltd. Contracts for rubber insulated cables renewed for six months—Durham Cables; William Geipel; Mersey Cable Works. Contracts for meters renewed for six months—British Electric Meters; Ferranti; Landis & Gyr; Measurement; Sangamo Weston; Smith Meters; Venner Time Switches. Combined transformers and switchgear, and pole mounting transformers.—G.E.C.

Blackpool.—Electricity Committee. Accepted. Cable contracts extended.—B.I. Cables; Pirelli-General Cable Works.

Health Committee. Accepted. Internal telephone installation at isolation hospital.—Dictograph Telephones.

Eccles.—Electricity Committee. Accepted. Cookers.—Simplex Electric Co.

Huddersfield. — Electricity Department. Accepted. Modifications to main switches at power station.—Metropolitan-Vickers Electrical Co.

London.—ST. PANCRAS.—Special Emergency (Finance and General Purposes) Committee. Accepted. Modification of existing switchgear (£248).—A. Reyrolle & Co. Electric vehicle battery (£101 net).—Chloride Electrical Storage Co.

Manchester.—Electricity Committee. Accepted. Mercury arc rectifier equipments—Hewittic Electric Co. Low-voltage switchgear, etc.—Bertram Thomas.

Contracts extended for 12 months:—Static transformers—Ferranti. House-service cut-outs—Parmiter, Hope & Sugden and Siemens Electric Lamps and Supplies.

Rotherham.—Electricity Committee. Accepted. Twelve months' supply of transformers.—G.E.C.

Sheffield.—Electricity Committee. Accepted. 3-bulb mercury arc rectifier with transformer and control gear (£2,105)—Electric Construction Co. 5-panel DC traction feeder control switchboard (£960).—Whipp & Bourne.

In view of the increased costs of production, the Committee agreed to accept an increase of 3 per cent. in the basic schedule prices comprised in the contract for the supply and delivery of distribution cables by W. T. Glover & Co., increasing the estimated total cost to £24,264.

Transport Committee. Accepted. Twenty-four tramcar controllers (£1,668).—B.T.H. Co.

Southport.—Transport Committee. Accepted. Electrical gear and wiring at transport depot (£82).—McGoff & Vickers.

Electricity Committee. Accepted. Transformers for 12 months.—Electric Construction Co.

Warrington.—Electricity Committee. Accepted. Extension of contract for the supply of transformers for a further twelve months.—Electric Construction Co.

York.—Electricity Committee. Recommended. Electric locomotive required for coal handling (£2,210).—Metropolitan - Vickers Electrical Co. Coal elevating and drag scraper coal storage plant, including civil engineering work (£13,464).—International Combustion.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barnard Castle.—Hospital annexe; Durham county architect.

Benfleet.—Community feeding centre at South Benfleet, for U.D.C.; surveyor, Council Offices, Thundersley, South Benfleet.

Birkenhead.—Extensions, isolation hospital; Lloyd & Cross, Ltd.

Emergency hospital; borough engineer, Arrowe Hall.

Birmingham.—Emergency feeding centres (130); city engineer.

Bolton.—Workshop, Weston Street; Bolton & Hayes, Ltd.

Bridgwater.—Improvements at St. John's School, for Borough E.C.; borough engineer, Town Hall.

Cardiff.—Houses (100); Office of Works. Building repairs (£100,000); city engineer.

Chester.—Kitchen centre at Hoole Lane and combined kitchen and restaurants at Upper Northgate Street, Grosvenor Road and Boughton for City Council; C. Greenwood, city surveyor, Municipal Buildings.

Chislehurst.—Community feeding centres at the Oval and Methodist Hall, Sidcup, and Beaconsfield Parade, Mottingham, for U.D.C.; E. T. Chater, clerk, Sidcup Place, Sidcup, Kent.

Finchley.—Canteens at three schools, and central kitchen at Ballards Lane (£1,100), for B.C.; P. T. Harrison, borough engineer, 294-6, Regent's Park Road, Finchley, N.3.

Hendon.—Warehouse premises, Sheaveshill Avenue, N.W.9, for Titanine, Ltd.; L. H. Fewster & Partners.

Hensingham.—New school, for Whitehaven E.C.; town clerk, Town Hall.

Hyde.—Workshop, Godley Mills, Bottom Street; J. North & Sons, Ltd.

Structural alterations, "Jolly Carter," Market Square, and "Bank Cottage," Flowery Field, for Gartside Brewery Co., Ltd., Ashton-under-Lyne; T. Buckley, resident architect.

Ilkeston.—Garage and buildings, Manor Road, for Barton Transport, Ltd., Beeston, Notts; H. Tatham Sudbury, architect, Rutland Chambers, Lord Haddon Road.

Jarrow-on-Tyne.—Houses (27) to be repaired and two houses to be converted into shops (£1,000); J. S. Weir, borough engineer, Town Hall.

Leeds.—Conversion of block of flats into temporary offices; city engineer.

Leyton.—Community feeding centres scheme, for T.C.; borough surveyor, Town Hall, Leytonstone, E.10.

Middlesbrough.—Additions, Smeaton Street, for J. W. Meredith & Son, confectioners; Kitching & Co., architects, 21 Albert Road.

Middleton-St.-George (Co. Durham).—Store house, Dinsdale Works, for W. H. Arnott Young & Co., Ltd.

Northumberland.—First-aid posts at Berwick, Ashington, Whitley Bay, Gosforth, and Morpeth (£1,250), for C.C.; W. W. Tasker, county architect, County Offices, Morpeth.

Rotherham.—Offices, Trubite Works, Meadowhall; A. Lee & Sons, Ltd.

Sheffield.—Conversion of cinema to stores, London Road and Boston Street; Marks & Spencer, Ltd.

Shop, Jessop Street; Montague Burton, Ltd.

Offices, Silver Hill House, Eccleshall Road; Thos. W. Ward, Ltd.

Shotley Bridge (Co. Durham).—Alterations to the Shotley Bridge Hospital, for Newcastle City Council; plans by city architect, 18, Cloth Market, Newcastle-on-Tyne.

Southport.—Biscuit factory additions, Marshside Road; E. S. Wallbridge.

Stretford.—Public baths reinstatement, Northumberland Road, Old Trafford (£10,000); Cruickshank and Seward, architects, 16, Princes Street, Manchester.

Sunderland.—Switch house, for the Corporation Electricity Department; W. A. Royle, electrical engineer.

Swansea.—Public shelters (£100,000), for Precautions Committee; borough surveyor, The Guildhall.

Taunton.—Church, Halcon housing estate; Bath and Wells Diocesan Board of Finance.

Tynemouth.—Workshop, Queen Alexandra Road, for J. H. Rogers; Cackett, Burns Dick & McKellar, architects, 21, Ellison Place, Newcastle-on-Tyne.

Community feeding centre, Dene Street (£1,300); municipal café, John Street, Cullercoats, and cafés at East End and New York Social Club, for T.C.; borough surveyor, Howard Street.

Winlaton. — Adapting mill as school (£1,050); Durham county architect.

York.—Alterations, St. Sampsons Square, and additions "Light Horseman" inn, Fishergate; Tadcaster Tower Brewery Co., Ltd.